

T. Olsen
20 Je. 1907

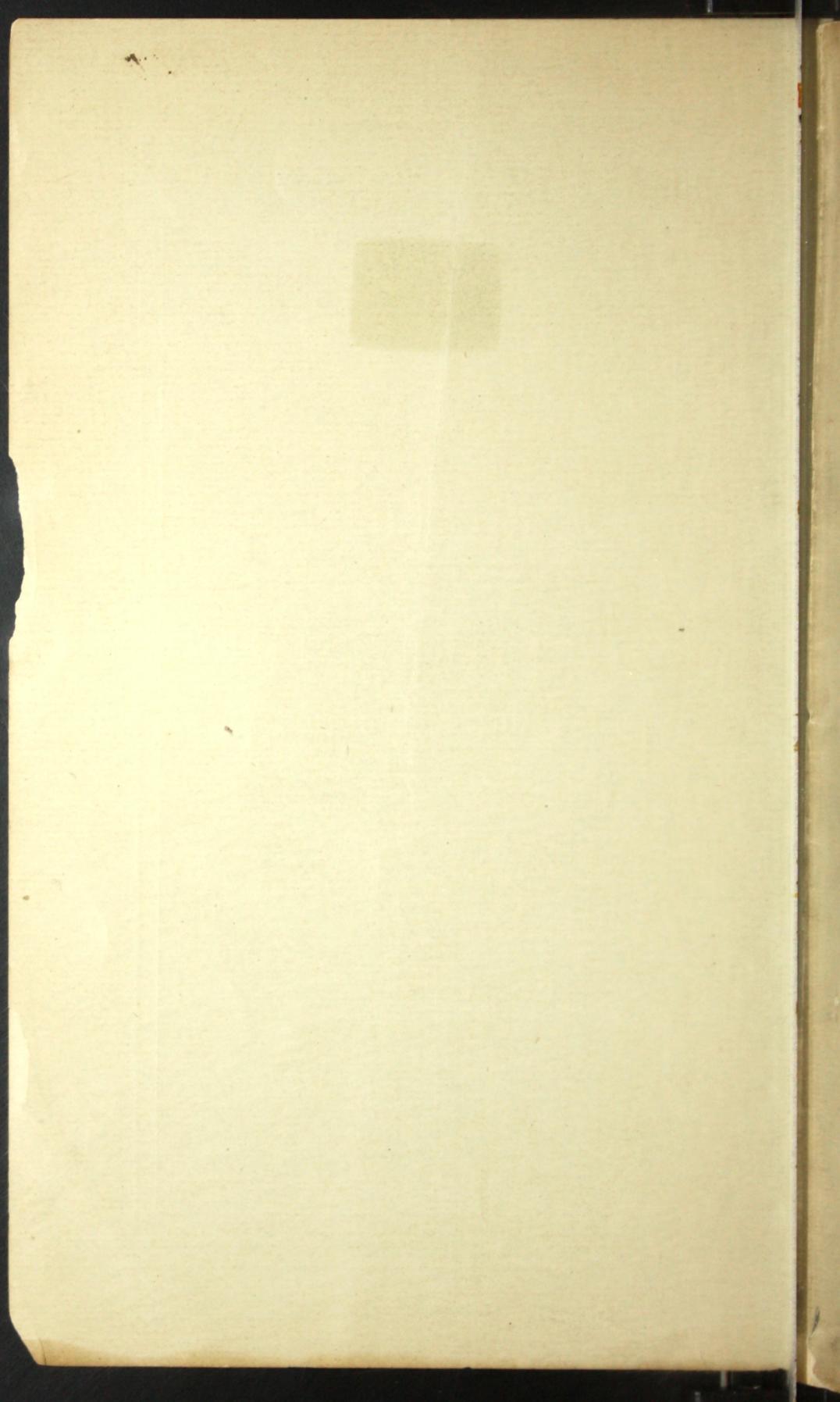
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JW

CATALOGUE
OF THE
WESTERN ELECTRIC
Manufacturing Company,

220 KINZIE ST.,

CHICAGO, ILL.

electric supplies



CATALOGUE

OF

WESTERN ELECTRIC MANUFACTURING CO.

MANUFACTURERS AND JOBBERS OF

MORSE TELEGRAPH INSTRUMENTS; PRINTING INSTRUMENTS; LINE EQUIP-
MENTS, BATTERY AND OFFICE SUPPLIES; OFFICE AND MAGNET
WIRE; ELECTRIC ANNUNCIATORS, BELLS AND BURGLAR
ALARMS; ELECTRO-MEDICAL, BLASTING, GAS
LIGHTING AND EXPERIMENTAL APPARATUS;
STANDARD ELECTRIC BOOKS, AND
MERCURIAL FIRE ALARM.

CHICAGO:

JAMESON & MORSE, PRINTERS, 162 CLARK ST.
1876.

WESTERN ELECTRIC MANUFACTURING CO.,

220 TO 232 KINZIE ST., CHICAGO.

Cash Capital and Surplus, \$200,000.

ANSON STAGER, PRESIDENT.

STAFFORD G. LYNCH, VICE-PRESIDENT.

ENOS M. BARTON, SECRETARY.

ELISHA GRAY, ELECTRICIAN.

GEO. H. BLISS, GENERAL AGENT.

M. G. KELLOGG, SUP'T M'F'G DEP'T.

AGENCIES,

Where Western Electric Manufacturing Company's
Goods can be ordered at home prices:

BRANCH OFFICE, 1202 CHESTNUT STREET, PHILADELPHIA,
GEO. L. BEETLE, Agent.

ST. LOUIS,	- - - - -	R. C. CLOWRY.
PITTSBURGH,	- - - - -	C. O. ROWE.
MOBILE,	- - - - -	C. G. MERRIWETHER.
MILWAUKEE,	- - - - -	C. H. HASKINS.
CINCINNATI,	- - - - -	J. O. SHIRAS.

The GOLD & STOCK TELEGRAPH Co. supplies the Gray Automatic
Printer at all points where their Rental System for Private Lines is in
operation.

The PHILADELPHIA LOCAL TELEGRAPH Co. supplies the Gray
Printer in Philadelphia, Pa.

The CENTRAL DISTRICT AND PRINTING TELEGRAPH Co. supplies
the Gray Printer at Pittsburgh, together with our Annunciators and
Burglar Alarms.

INTRODUCTORY.

CHICAGO, ILL., June, 1876.

The WESTERN ELECTRIC MANUFACTURING CO. was organized under the general laws of Illinois, in 1872.

Its present Cash Capital and Surplus is \$200,000.

It succeeds by purchase or consolidation to the business of the Caton Instrument Factory of the Western Union Telegraph Company, at Ottawa, Ill., and to that of Gray & Barton, and Bliss, Tillotson & Co., and Geo. H. Bliss & Co., of Chicago, and of the Electric Improvement Co., of Galesburg, Ill.

Its capital, annual product and sales far exceed those of any other establishment in the electric business on the American continent.

Its manufactory is abundantly furnished with the most perfect and modern tools, both for general and special work, known to the trade.

By the payment of high wages and by affording an opportunity for the investment of savings in the stock of the Company, a choice of workmen has been possible, resulting in maintaining a large body of thoroughly skillful mechanics who have had many years experience in the manufacture of electrical instruments.

With such ample resources, the aim has been, and will be, to furnish the trade with the best instruments and goods which can be produced, and at reasonable prices.

All the component parts of electrical instruments and apparatus are made from the raw materials within this establishment, and the payment of any tax to other manufacturers is avoided. A better class of goods can therefore be afforded to customers, at the same prices, than can be obtained elsewhere.

Exclusive attention is given to the manufacture and sale of Electrical and Telegraphic Apparatus, but in this field the intention is to cover the entire ground, as will be apparent from an examination of the following pages.

An invitation is extended to all who have occasion to purchase goods in this line to investigate our facilities and the superior inducements which are offered.

DESCRIPTIVE.

The WESTERN ELECTRIC MANUFACTURING CO. occupies the second and third stories of the block numbered 220 to 232 Kinzie St., and the store and basement of number 220 Kinzie St., Chicago.

INSTRUMENT SHOP.

The main instrument shop, in the third story, is 120 feet long by 86, and is well lighted on three sides and from the roof.

MISCELLANEOUS.

Capacious rooms on the third floor are used for the paint shop, storage of castings, raw materials and manufactured work; also for battery and experimental purposes.

INSULATING ROOM.

The insulating room in the second story is 40 feet square. It has a capacity of several tons per month, and the perfection of office and magnet wire is constantly being turned out in large quantities.

CABINET ROOMS.

Rooms 86 feet by 20, and 20 feet by 20, in the second story, are used for wood working purposes, including the manufacture of Instrument Bases and Annunciator Cases of the most elaborate character.

LABORATORY.

The laboratory is located in the third story, and has ample accommodations for electrical, chemical, and other scientific investigations.

FOUNDRY.

The foundry is 20 feet by 50, and is in the basement of 220 Kinzie Street. Four Furnaces are kept in operation with the capacity of one ton of brass castings and twenty tons of zinc castings per month.

ANNEALING FURNACE.

The annealing furnace is located in the same basement, and is specially adapted to the treatment of magnet cores so as to remove as nearly as possible all liability to permanent magnetism.

ENGINE ROOM.

The engine room, 20 feet by 65, is in the same basement. The engine, of thirty horse power, is a fine piece of machinery. The boilers have sufficient capacity to furnish steam for the engine, and to heat the entire buildings.

STORE.

The store is located on the ground floor, at 220 Kinzie Street, and is 86 feet by 20. Here can always be found a complete assortment of Electrical Apparatus and Supplies.

STORAGE.

A room, 90 feet by 86, in the second story of the buildings before enumerated, is used for the storage of line wire, insulators, battery tumblers and general stock.

OFFICES.

The offices of the Company are located in the second story; the entrance being at 220 Kinzie Street. Rooms 30 feet by 25, and 10 by 20 feet, are conveniently fitted up for business, where the officers of the Company are always on hand ready to welcome patrons, impart information or receive orders.



In appropriate places in this Catalogue will be found full descriptions of the various articles of our trade.

We shall be pleased to furnish additional information at any time to parties desiring to make purchases.

We have enumerated the various books containing general information likely to be of service to persons seeking knowledge in any branch of the business. These books we keep for sale at the prices named.

We thank our customers for the very liberal patronage bestowed upon us heretofore, and assure all that every exertion will be made to maintain the lead in every department of the Electrical field.

WESTERN ELECTRIC MANUFACTURING CO.,

220 Kinzie St., Chicago, Ill.

MORSE INSTRUMENTS.

Our Magnet Cores are made of the best Norway iron, so thoroughly annealed as to avoid as nearly as possible the presence of permanent magnetism.

The Magnets are wound with wire having 96 to 99 per cent. of the conductivity of pure copper.

We insulate our own wire in the most thorough manner.

We have always a large quantity of Relays, Sounders and other instruments completed, with the exception of putting wire on the magnets. Upon receipt of an order, we can fill up these magnets with wire of any size, so as to make the resistance exactly as desired.

We prefer to use mahogany in the bases of our instruments for the reason that it takes a high polish, and, especially, because it is the least liable of all the fancy woods to warp or split.

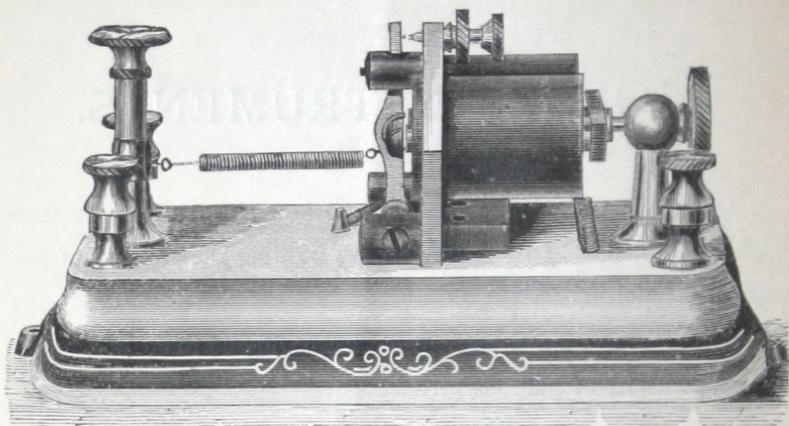
The brass work is all milled to a uniform size, and made of the best metal.

The greatest elegance of design and fineness of finish are combined, consistent with utility and durability of the instruments.

Add twenty per cent. to the list to obtain the price of nickel plated instruments.

REGISTER.

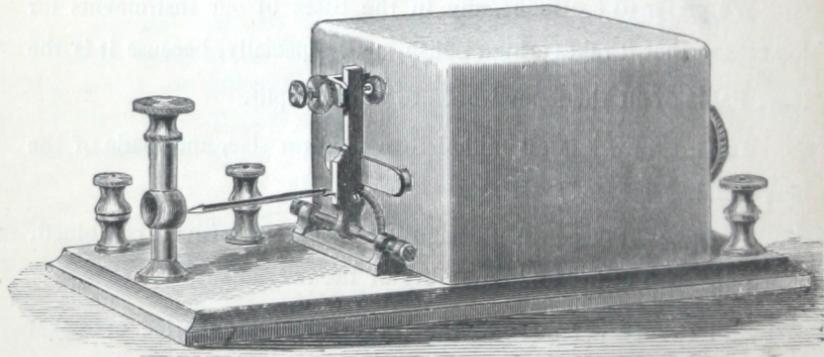
Phelps Pattern, with Spring.....	\$65 00
Caton " 	50 00
Caton, Main Line.....	55 00
No. 2.....	45 00



No. 2 Relay, Phelps Pattern.

RELAY.

No. 1, Caton Pattern	\$17 00
No. 2, Phelps "	15 00
No. 3	12 00



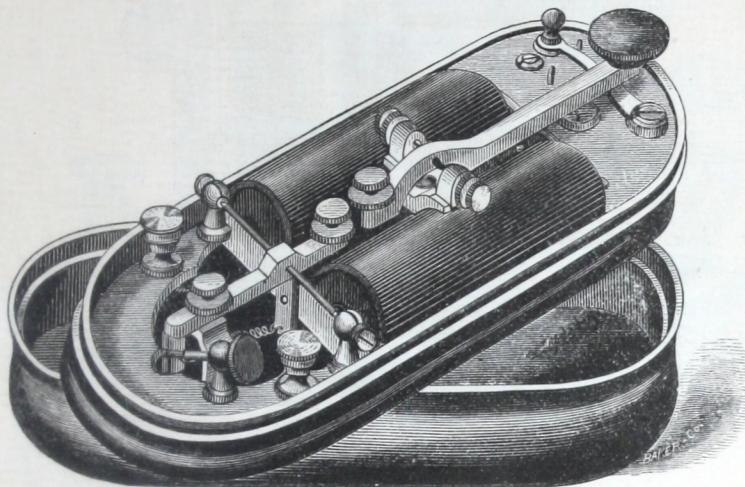
No. 1 Box Relay.

RELAY, BOX.

No. 1	\$17 00
No. 1, with Key	22 00
No. 2	15 00
No. 2, with Key	20 00

RELAY, SOUNDING.

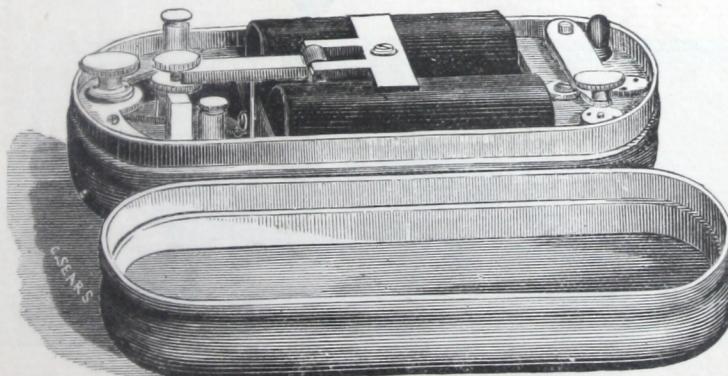
Caton	\$17 00
Caton, with Key	22 00



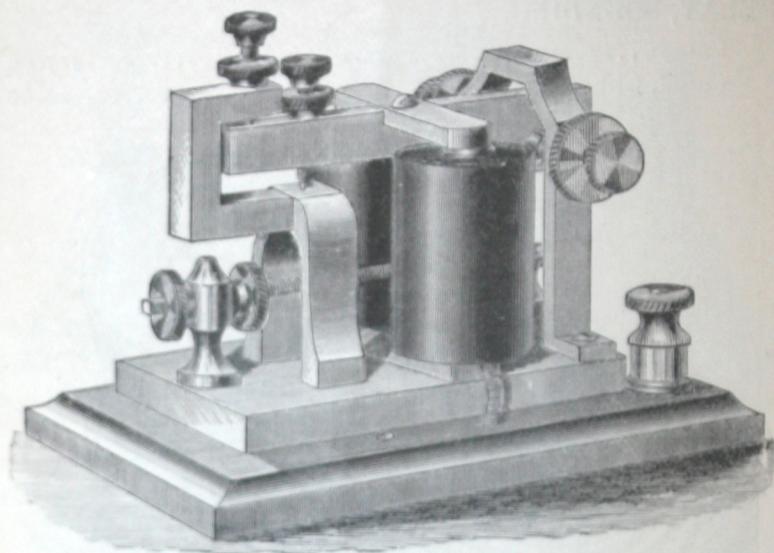
No. 1 Patent Pocket Relay.

RELAY, POCKET.

No. 1, Patent	\$18 00
No. 2, Caton	15 00



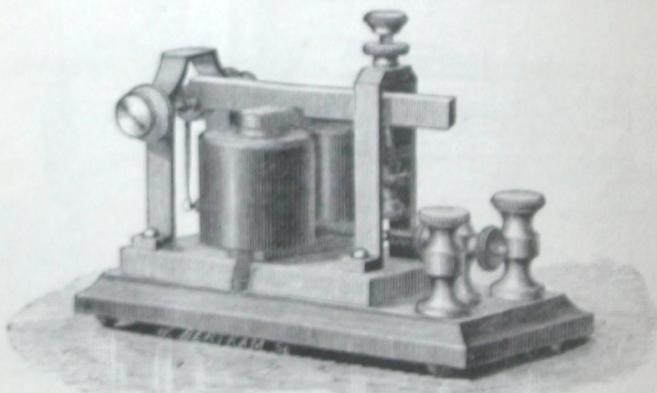
No. 2 Caton Pocket Instrument.



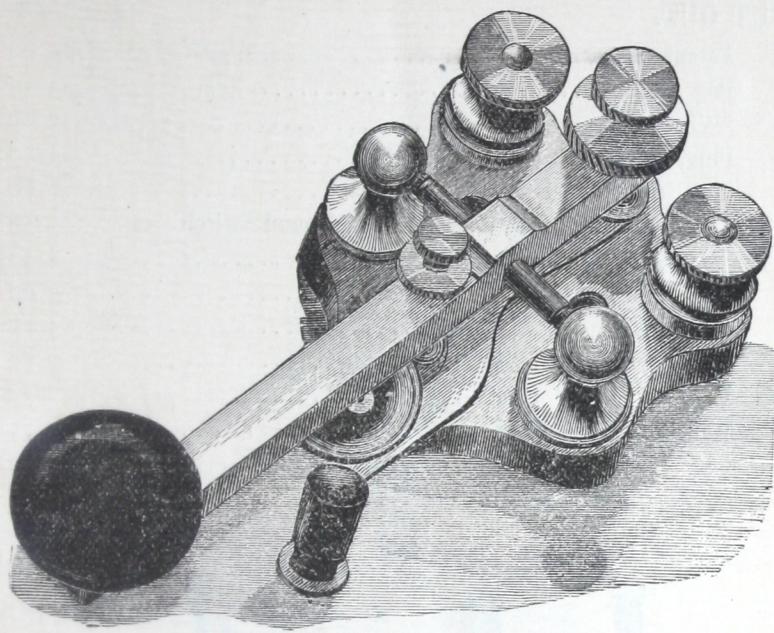
No. 1 Sounder.

SOUNDER.

No. 1.....	\$ 7 50
No. 2.....	7 00
No. 3.....	6 00
Repeating.....	10 00



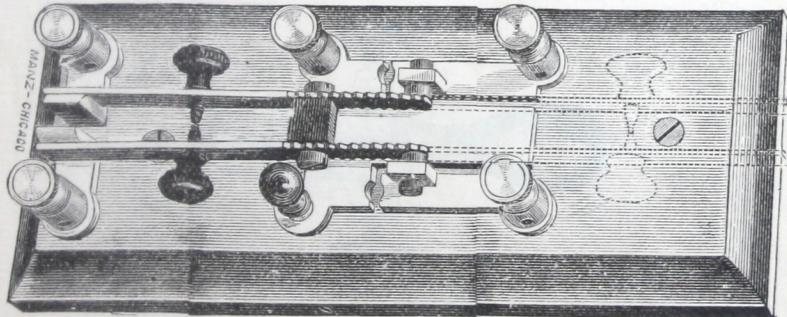
No. 2 Sounder.



No. 1 Lewis Legless Key. All Connections are on the Top.

KEY.

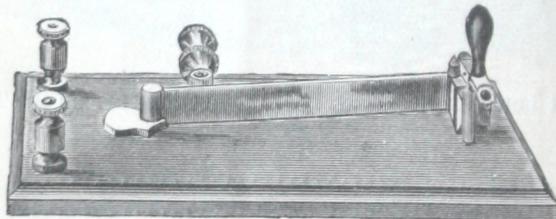
No. 1, Lewis Patent.....	\$5 00
No. 2, Western Union.....	4 50
No. 3, small size.....	3 00



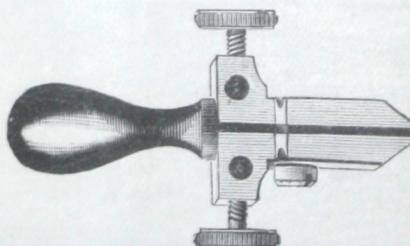
Patent Cut Out, with Lightning Arrester and Ground Switch. All Connections are on the Front.

CUT OUT.

Patent	\$5 00
Peg	3 50
*Wilson	5 00
Plug, single	3 00
" double	6 00
" with Lightning Arrester and Ground Switch	5 50
" with Ground Switch	4 50
" new style	5 00
†Main Line	5 50
Plug for Cut Out	1 00
Peg " " "	30
Wilson Cut Out Cord	75
" " Switch Cord	1 00
" " Binding Post	25



Plug Cut Out.



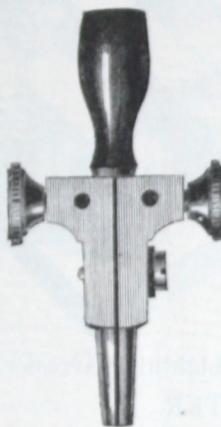
Plug for Cut Out.

*This includes two Cut Out Cords and two Binding Posts.

†To be used on train in case of wreck.

SWITCH.

Button Repeater.....	\$6 00
Battery.....	1 25
Battery, double.....	2 50
Ground.....	1 00



Switch Loop Plug.

SWITCH BOARD, WESTERN UNION, PEG.

Size 4×6.....	\$10 00	Size 18×20.....	\$65 00
" 6×8.....	18 00	" 20×22.....	75 00
" 8×10.....	25 00	" 22×24.....	85 00
" 10×12.....	30 00	" 24×26.....	95 00
" 12×14.....	37 50	" 26×28.....	110 00
" 14×16.....	45 00	" 28×30.....	125 00
" 16×18.....	55 00	" 30×32.....	135 00

To order, any size.

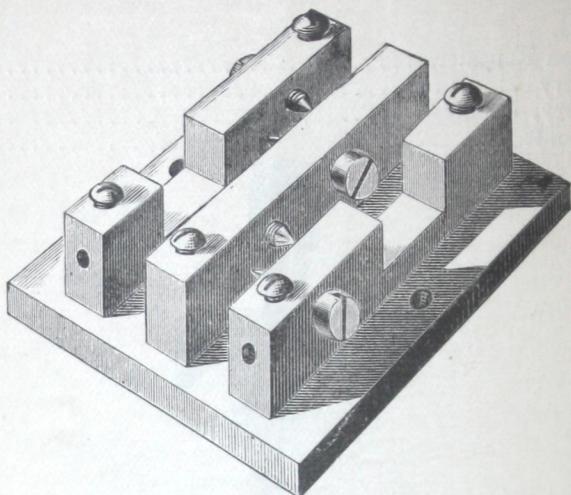
SWITCH BRACKETS, per pair.....	\$1 50
SWITCH WRENCHES.....	1 25

JONES'S PATENT LOCK SWITCH.

To order, any size.	
LOOP BOARD, per wire.....	\$2 25
LOOP BOARD PLUG.....	1 50
LOOP CORD.....	1 50
SPRING JACK, per wire.....	6 50
" " PLUG.....	2 00
" " CORD.....	1 50

REPEATER, AUTOMATIC.

Milliken-Hicks.....	\$100 00
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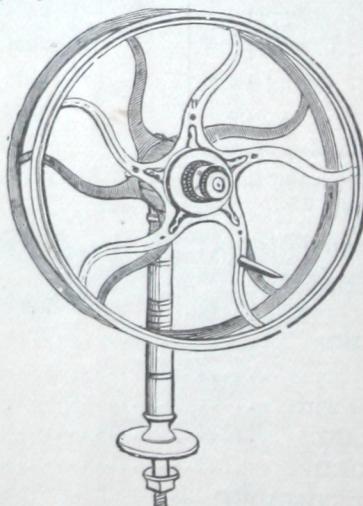


Lightning Arrester.

LIGHTNING ARRESTER.

Single line, Terminal, 3 Points	\$2 00
" " " 6 "	3 00
" " Through, 6 "	3 00
Cable, 1 Wire	3 00
" 2 "	6 00
" 3 "	9 00

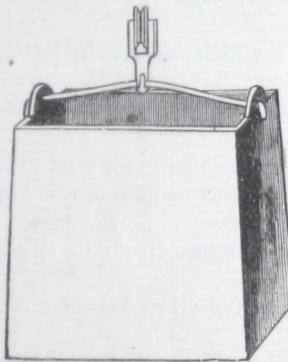
To order, any style and size.



Register Reel.

PARTS OF INSTRUMENTS.

Register Key	\$1 25
" Cord.....	35
" Weight and Pulley.....	2 25
" " without Pulley.....	1 75
" Pulley.....	50
" Reel.....	3 00
Base, Relay.....	1 00
" Sounder.....	60
Binding Post.....	18
Binding Post, Table, Single.....	20
" " " Double.....	30
Key Lever Knob.....	25
" Circuit Closer Knob.....	10
Table Adjusting Post.....	75
Caton " "	1 00
Trunnion Set Screw.....	20
Adjustment Screw and Nut.....	20
No. 1 Sounder Magnet.....	4 50
" 2 " "	3 25
Relay Springs, per dozen.....	75
Platinum Point.....	20



Register Weight.



Instrument Binding Post.

We control the following patents relating to the foregoing class of instruments:

Gray, No. 110,970, Jan. 17, 1871.
 Lewis, Design, No. 8,342, May 25, 1875.
 Hill, No. 165,578, July 13, 1875.
 Gray, No. 114,938, May 16, 1871.
 Lewis, No. 177,856, May 23, 1876.

Other patents applied for.

BATTERY SUPPLIES.

We are sole agents in the United States for the manufacture and sale of the following forms of Gravity Battery:

The CALLAUD BATTERY; which is the standard battery of the French Government Telegraph Administration, of the Western Union Telegraph and other companies in Europe and America, making it the most popular form of battery in the market.

The HILL BATTERY, which has been favorably known for many years, being used exclusively by the American Fire Alarm Telegraph, and to a large extent by many railroads, and for medical purposes.

The HASKINS GRAVITY BATTERY, which is the standard battery of the Northwestern Telegraph Company. It meets with a large sale, and gives excellent results.

The BLISS RESERVOIR BATTERY, with which have been combined some recent improvements of Dr. E. A. Hill. It gives a strong current and runs a long time without attention.

The two first are the original forms in which the Gravity Batteries were first perfected and introduced.

The two last have been more recently brought into the market, and have met with a well deserved success.

Modified forms of these batteries are being offered for sale, against which caution is given, both on account of infringement and inferiority.

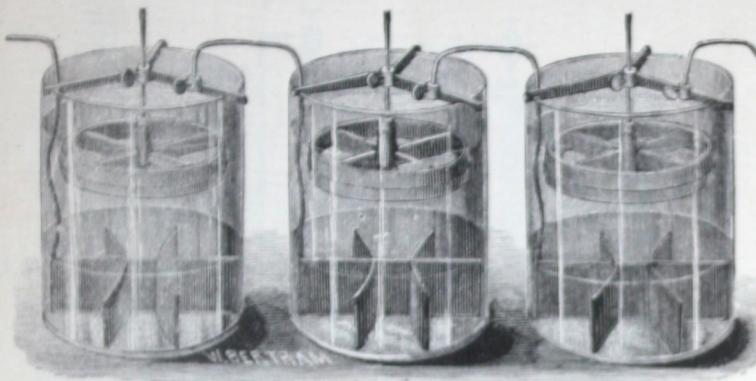
Having the title to the original patents as well as the latest improvements in details, our customers can purchase from us the best batteries, and be protected in their use.

We have an arrangement with an extensive Glass Manufactory to make Battery Tumblers exclusively for us.

These Tumblers are very white, and are kept in the annealing oven more than double the ordinary time, so effectually drawing the temper that it is almost impossible to crack the glass by any change of temperature, however sudden. We will make special terms of a very favorable character to wholesale and retail dealers and consumers in large quantities for this class of product.

Our battery zincs are made from metal selected and refined especially for our business, so as to contain less than one-half of one per cent of lead, and not over one per cent of all impurities.

We keep in stock a full supply of the various batteries, chemicals and utensils named in the list, and can fill large or small orders with promptness.



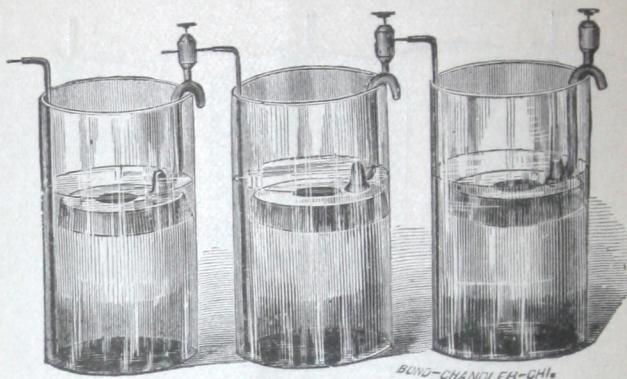
Callaud Battery.

CALLAUD BATTERY.

LOCAL, (Diameter of Jar, 6 inches; height, 8 inches.)

CELL COMPLETE.....	I 60
Zinc.....	50
Copper.....	25
Tripod and Connection.....	30
Jar, Glass.....	55
MAIN—LARGE SIZE (Jar, 6x8).	
CELL COMPLETE.....	I 50
Zinc.....	50
Copper.....	25
Tripod Hanger.....	20
Jar, Glass.....	55
MAIN—SMALL SIZE (Jar, 5x7).	
CELL COMPLETE.....	I 40
Zinc.....	45
Copper.....	25
Tripod Hanger.....	20
Jar, Glass.....	50
LOCAL—EXTRA SIZE (Jar, 7x8).	
CELL COMPLETE.....	I 75
Zinc.....	65
Copper.....	25
Tripod Hanger.....	20
Jar, Glass.....	65

In ordering Zines, Coppers, or Tripods for Callaud Battery, give size of Jar for which they are intended.



Hill Battery.

HILL BATTERY.

LOCAL—No. 3 (Jar, 6½x6).

CELL COMPLETE.....	\$1 40
Zinc.....	45
Copper.....	25
Hanger.....	20
Jar, Glass.....	50

MAIN—No. 1 (Jar, 5x6).

CELL COMPLETE.....	1 20
Zinc.....	35
Copper.....	15
Hanger.....	20
Jar, Glass.....	50

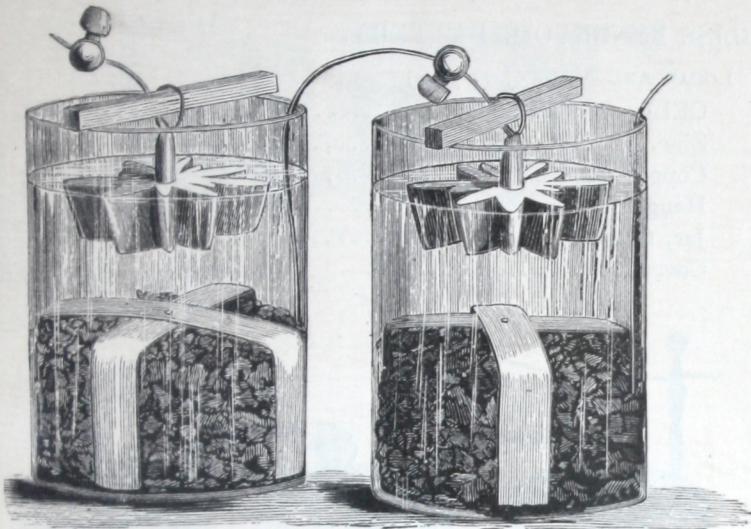
MAIN—No. 2 (Jar, 6x6).

CELL COMPLETE.....	1 30
Zinc.....	40
Copper.....	20
Hanger.....	20
Jar, Glass.....	50

No. "O"—STUDENT'S (Jar, 4x5).

CELL COMPLETE.....	65
Zinc.....	20
Copper.....	13
Hanger.....	12
Jar.....	20

In ordering material for Hill Battery, give size of Jar for which it is intended.

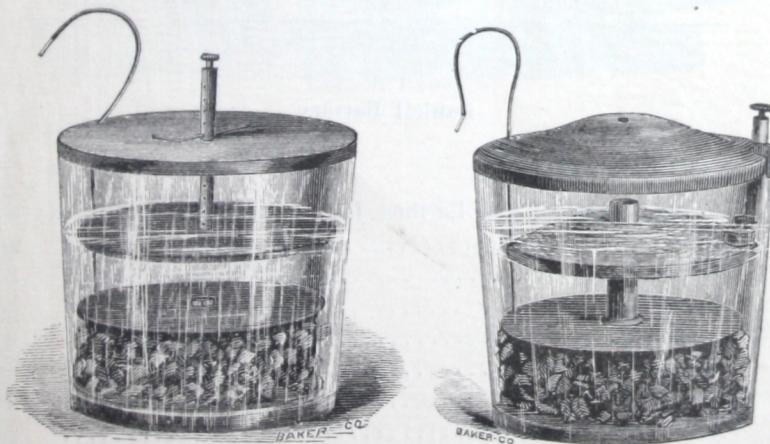


Haskins Battery.

HASKINS BATTERY.

LOCAL AND MAIN (Jar, 6x8).

CELL COMPLETE.....	\$1 75
Zinc.....	65
Copper.....	35
Connector and Hanger.....	25
Jar, Glass.....	50

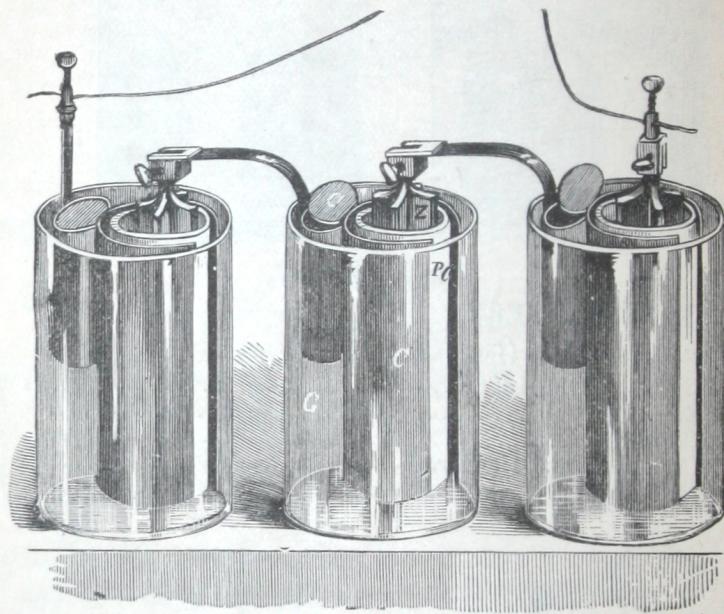


Patent Reservoir Battery, Bliss & Hill Combination.

BLISS RESERVOIR BATTERY.

LOCAL AND MAIN (Jar, 7x6.)

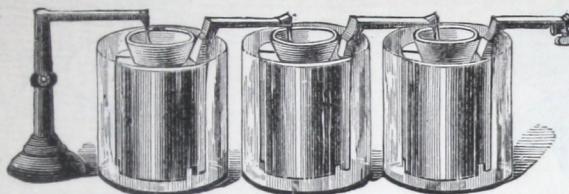
CELL COMPLETE.....	\$2 00
Zinc.....	70
Copper.....	35
Hanger.....	30
Jar, Glass.....	50
Cover	15



Daniell Battery.

DANIELL BATTERY.

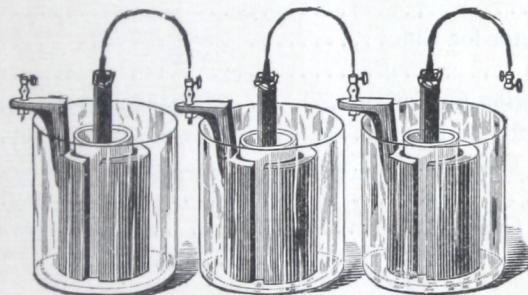
CELL COMPLETE, Earthen Jar.....	\$1 65
Zinc.....	40
Copper.....	40
Porous Cup.....	20
Pocket.....	15
Clamp.....	25
Jar, Earthen.....	25
Jar, Glass.....	50
Porous Cups, Optimus.....	per doz., 2 25



Grove Battery.

GROVE BATTERY.

CELL COMPLETE.....	\$2 00
Zinc.....	45
Platinum.....	1 00
Porous Cup.....	15
Jar.....	40
Porous Cups.....	per doz., 1 25
Jars.....	" 3 50
Standard.....	1 00

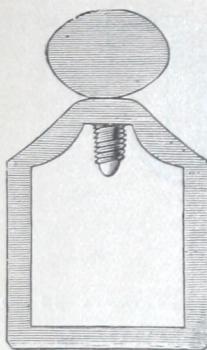


Carbon Battery.

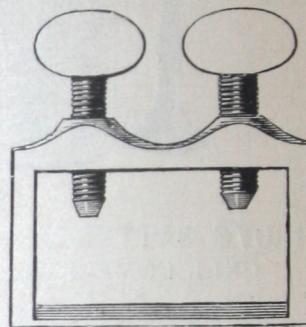
CARBON BATTERY.

No. 1 (4 in. Jar).

CELL COMPLETE.....	\$2 00
Zinc.....	45
Connector for Zinc.....	25
Carbon.....	30
Clamp for Carbon.....	40
Porous Cup.....	15
Jar.....	45
Porous Cups.....	per doz., 1 25
Jars.....	" 4 00



Carbon Clamp No. 1.



Carbon Clamp No. 2.

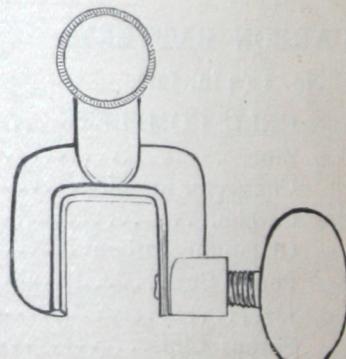
CARBON BATTERY.

No. 2 (6 in. Jar.)

CELL COMPLETE.....	\$4 50
Zinc.....	1 10
Connector for Zinc.....	30
Carbon.....	90
Connection for Carbon.....	75
Clamp for Carbon.....	45
Porous Cup.....	40
Jar.....	60
Porous Cups.....	per doz., 4 50
Jars.....	" 6 00



Carbon Zinc Connector.



Daniell Clamp.

BUNSEN BATTERY.

Same as Carbon.

SMEE BATTERY.

No. 1.

CELL COMPLETE	\$3 00
Zincs (rolled) per pair.....	50
Platinized Silver Plate and Connection.....	1 75
Zinc Clamp.....	50
Jar	25

No. 2.

CELL COMPLETE	5 00
Zincs (rolled) per pair.....	1 00
Platinized Silver Plate and Connection.....	3 00
Zinc Clamp.....	50
Jar	50

No. 3.

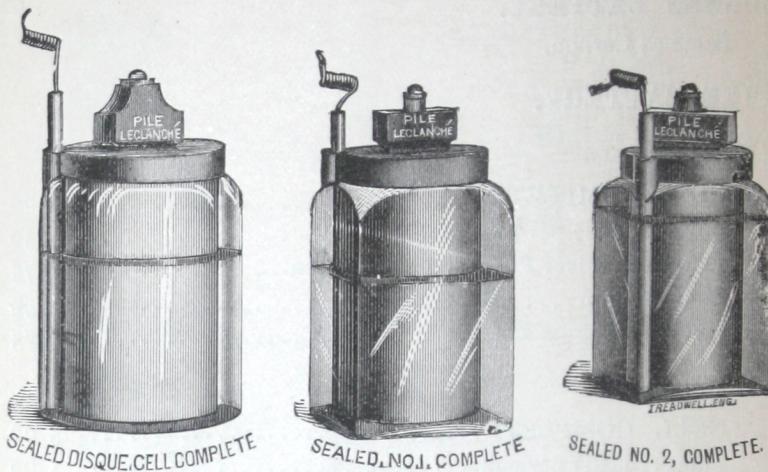
CELL COMPLETE	7 00
Zincs (rolled) per pair.....	1 50
Platinized Silver Plate and Connection.....	4 25
Zinc Clamp.....	75
Jar	50

No. 4.

CELL COMPLETE	10 00
Zincs (rolled) per pair.....	2 00
Platinized Silver Plate and Connection.....	6 75
Zinc Clamp.....	75
Jar	50

GRENET BATTERY.

No. 1, 6 inches high, complete.....	\$2 50
" 2, 8 " " "	4 50
" 3, 10 " " "	5 50
" 4, 12 " " "	6 50



Le Clanche Battery.

LE CLANCHE BATTERY.

DISQUE.

CELL COMPLETE.....	\$2 50
" " sealed.....	2 65
Porous Cup.....	1 95
Jar.....	40
Zinc, Amalgamated.....	15

No. 1.

CELL COMPLETE.....	2 25
" " sealed.....	2 40
Porous Cup.....	1 75
Jar.....	35
Zinc, Amalgamated.....	15

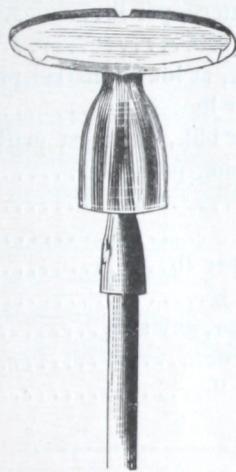
No. 2.

CELL COMPLETE.....	1 80
" " sealed.....	1 95
Porous Cup.....	1 35
Jar.....	30
Zinc, Amalgamated.....	15

Electro-Medical and Galvano-Cautery Batteries will be found under the head of Electro-Medical Apparatus.

BATTERY UTENSILS.

Brushes, No. 1, Main, per doz.....	\$6 00
" " 2, " "	5 00
" " 1, Local "	6 00
" " 2, " "	5 00
Funnels, Glass, No. 1.....	25
" " 2.....	35
" Glass or Gutta Percha, No. 3.....	50
Glass Strips.....	



Robertson's Battery Insulator.

Insulators, Robertson's Patent.....	30
" " Brooks' Patent.....	1 00
Insulator Pins.....	4
Stands, to order, any size.....	
Syringe, No. 6, with Solid Piston.....	2 50
Extra Pipes for do.....	75
Syringe, No. 6, with Hollow Piston.....	1 75
Hydrometers for Hill Battery.....	50
" " Callaud Battery.....	50
Acidometers	1 00



COMPLETE

... \$2 50
... 2 65
... 1 95
... 40
... 15
... 2 25
... 2 40
... 1 75
... 35
... 15

1 80

1 95

1 35

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be found

BATTERY CHEMICALS AND METALS.

Acid, Nitric (41°), per lb.....	\$ 20
“ “ “ per carboy, at lowest market price.....	10
“ Sulphuric, per lb.....	10
“ “ per carboy, at lowest market price.....	10
“ Hydro-chloric, per lb.....	40
Bi-chromate Potash, per lb.....	40
“ “ per bbl., at lowest market price.....	15
Blue Vitriol, small packages, per lb.....	15
“ per bbl., at lowest market rates.....	15
Bi-sulphate of Mercury, per lb.....	2 50
Fluid for Carbon Battery, per lb.....	15
Quicksilver, per lb.....	1 25
“ per flask, at lowest market price.....	15
Sulphate of Zinc, per lb.....	15
“ “ per bbl., at lowest market price.....	2 00
Bi-chloride of Platinum, per oz.....	25
Sal Ammoniac	25
Spelter, market rate.....	20
Rolled Zinc Plates, per lb.....	1 00
Carbon Plates 6 x 9 x $\frac{1}{4}$	1 00
“ “ to order, any size.....	1 00
Platinum, sheet, per oz.....	1 00
“ wire “ “	1 00

We control the following patents relating to the foregoing batteries:

Callaud, No. 120,034, Oct. 17, 1871.
 Hill, No. 114,005, April 25, 1871.
 Hill, No. 114,006, April 25, 1871.
 Hill, No. 39,571, Aug. 18, 1863; re-issue, 2,504, March 12, 1867.
 Hill, No. 167,173, Aug. 31, 1875.
 Bliss, No. 176,270, April 18, 1876.

OFFICE SUPPLIES.

To meet the large commercial and railroad demand for Manifold Paper we are prepared to furnish it either in white, yellow or manilla sheets cut to any required size.

The ordinary size for telegraphic and commercial use is ten by fifteen inches, and for train-dispatching purposes five by eight inches. There are ten large books in the ream and thirty-five small ones.

Our nickel plated Stylus is fully equal to the best agate.

We call attention to the Orton Awl Clip, which is fast displacing the spring patterns, for telegraphic and other uses. It is durable and convenient, and is used by telegraph companies, bankers and merchants.

The Orton Pencil Holder saves the last third or half of the pencil, and is both convenient and economical.

The Orton Safety Hook prevents the loss of messages or papers by being blown away or carelessly dropped. Its popularity is increasing.

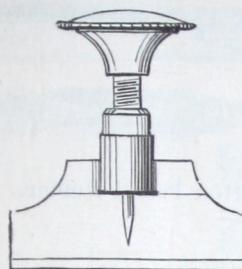
STATIONERY.

Blanks, to order	
Blank Books, to order.....	
Bill Paper.....	
Board Clips, No. 1.....	\$ 75
" " per dozen.....	7 00
" " No. 2, Message size, each.....	60
" " " " per dozen.....	5 50
Brass Clips, each.....	20
" " per dozen.....	1 75
Chamois Skins.....	75
Envelopes, plain or printed.....	
Ink, red or black.....	
Letter Paper.....	

MANIFOLD PAPER.....	Kind.	Size.	Per Book	10 Books.	100 Books.
" "	Yellow.	10 X 15	\$0 55	\$4 50	\$40 00
" "	White.	"	50	4 00	37 60
" "	Manilla	"	45	3 50	30 00
" "	Yellow.	5 X 8	15	1 25	10 00
" "	White.	"	15	1 10	9 00
" "	Manilla	"	12	1 00	8 00
BLACK SHEETS.....	Size.	Per Sheet	10 Sheets	100 Sheets.	
" "	10 X 15	15	1 25	10 00	
" "	5 X 8	10	80	5 00	

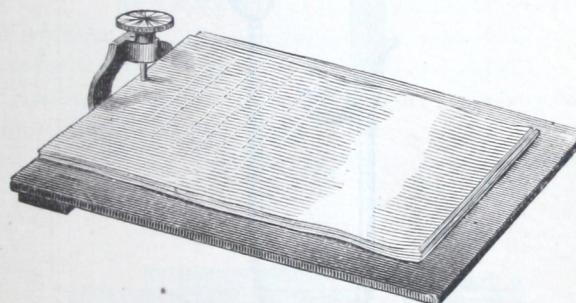
Enameled Sheets, each.....	\$	75
Stylus, Agate, No. 1.....		1 25
" " No. 2.....		1 00
" Steel, Nickel Plated.....		25
Message Paper, per lb.....		25
" " per case.....		20
*Message Press, Wilson Pattern.....		20 00
Pens, per gross.....	50 to	1 00
Pencils, ".....	\$3 00 to	9 00
Penholders, per gross.....	2 00 to	6 00
Pins, per dozen papers.....		75
" best, in $\frac{1}{2}$ lb. boxes.....		80
Printer Paper, per roll		10
Register Paper, per lb.....		25
" " in case, per lb.....		20
Rulers.....		75
Sealing Wax, per lb.....		00
Ticket Punches, per dozen.....		36 00

* Patent applied for.



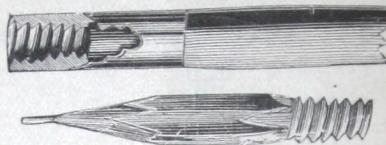
Orton Clip.

Orton Awl Clip.....	\$ 50
" " per dozen.....	5 40
" " per gross.....	57 60



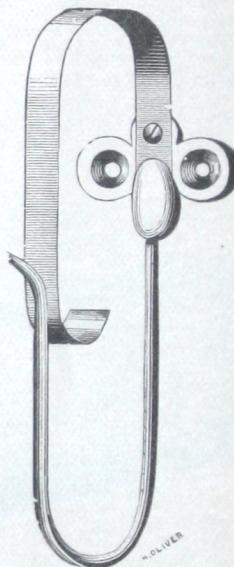
Orton Board Clip.

Orton Awl Clip Board, letter size.....	\$ 70
" " " per dozen.....	7 80
" " " per gross.....	86 40
" " " Message Size.....	65
" " " per dozen.....	7 20
" " " per gross.....	79 20



Orton Pencil Holder.

Orton Pencil Holder.....	\$ 15
" " per dozen.....	1 50
" " per gross.....	14 40

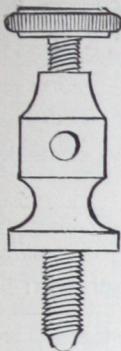


Orton Security Hook.

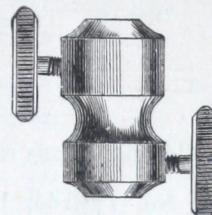
Orton Security Hook.....	\$ 30
" " per dozen.....	3 00
" " per gross.....	28 80
Plain Hook.....	15
" per dozen.....	1 50
Staples, Blind, per lb.....	60
" Patent, ".....	60

Off
Binding
Double
Desks.
Instru
Wind
Screw
Porcel
Pliable

Wind

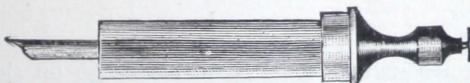


Office Binding Post.



Double Connector.

Binding Post	\$ 18
Double Connectors.....	30
Desks.....	
Instrument Tables, Plain.....	5 00
" " with Drawers.....	5 50
Window Connector.....	30
Screw Plate for 8 and 9 Wire.....	1 00
Porcelain Knobs, per dozen.....	60
Pliable Connecting Cord, per yard.....	20
" " Double, per yard.....	25



Window Tube and Connector.

Window Tubes, Heavy Glass, 3 inch, each.....	\$ 10
" " 4 " "	13
" " 5 " "	16
" " 6 " "	20
" " 8 " "	30
" " 10 " "	38
" " 12 " "	45

Window Tubes, Rubber,	2 inch, Polished, each.....	20
" "	3 " " "	25
" "	4 " " "	30
" "	6 " " "	35
" "	to order, any length, at five cents per inch.	

The following patents relate to the foregoing subjects:

Orton, No. 134,160, Dec. 24, 1872. Re-issued, No. 6,830,

Aug. 26, 1873.

Orton, No. 132,174, Oct. 15, 1872.

Orton, No. 145,230, Dec. 2, 1873.

BOOKS.

ALTHAUS.—A Treatise on Medical Electricity, Theoretical and Practical, and its use in the Treatment of Paralysis, Neuralgia and other diseases. By JULIUS ALTHAUS, M. D., M. R. C. P. Lond., Physician to the Infirmary for Epilepsy and Paralysis. 8vo; 729 pp.; \$6.00.

BEARD & ROCKWELL.—A Practical Treatise on the Medical and Surgical Uses of Electricity, including Localized and General Faradisation, Localized and Central Galvanization, Electrolysis and Galvano-Cautery, with nearly 200 illustrations. By GEO. M. BEARD, A. M., M. D., &c., &c., and A. D. ROCKWELL, A. M., M. D., &c., &c. 8vo; pp., 794; \$6.25.

BLISS.—Condensed Manual of Telegraphy, by GEO. H. BLISS. 16mo; pp. 25; 25 cents.

CLARK AND SABINE.—Electric Tables and Formulae, for the use of Telegraph Inspectors and Operators. By LATIMER CLARK and ROBERT SABINE. 12mo; pp. 285; \$2.50.

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25
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per inch.
No. 6,830,
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P. Lond.,
is. 8vo;
Medical and
neral Fara-
olysis and
M. BEARD,
. D., &c.,
H. BLISS,
for the use
CLARK and

CULLEY.—A Hand-Book of Practical Telegraphy, by R. S. CULLEY, Member Inst. C. E., Engineer in Chief of Telegraphs to the Post Office. Fifth Edition revised and enlarged. 8vo; Cloth; pp., 373; \$5.00.

DAVIS AND RAE.—HAND-BOOK OF ELECTRICAL DIAGRAMS AND CONNECTIONS, by CHARLES H. DAVIS AND FRANK B. RAE. 32 Plates Photo-Lithographed, and 46 pages Descriptive. \$1.50.

FERGUSON.—Electricity: by ROBERT M. FERGUSON, Ph. D., F. R. S. E., of the Edinburgh Institution. 12mo; pp., 287; \$1.75.

HASKINS.—The Galvanometer and its Uses: a Manual for Electricians and Students. By C. H. HASKINS. Pocket form; Illustrated; Morocco Tucks; \$2.00.

JENKIN.—ELECTRICITY AND MAGNETISM. By FLEEMING JENKIN, F. R. S., Professor of Engineering in the University of Edinburgh. Small 8vo; pp., 368; \$1.50.

LINCOLN.—Electro-Therapeutics: a condensed Manual of Medical Electricity. By D. F. LINCOLN, M. D., Physician to the Department of Diseases of the Nervous System, Boston Dispensary. 8vo; 186 pp.; \$1.50.

NAPIER.—A Manual of Electro-Metallurgy, including the Application of the Art to Manufacturing Processes. By JAMES NAPIER, F. C. S. Fourth Edition revised and enlarged; Illustrated; 8vo; 150 pp.; \$2.50.

POPE.—MODERN PRACTICE OF THE ELECTRIC TELEGRAPH. A HAND-BOOK for Electricians and Operators. By FRANK. L. POPE. Ninth edition revised and enlarged. 8vo; Cloth; pp., 155; \$2.00.

PREECE AND SIVEWRIGHT.—TELEGRAPHY: by W. H. PREECE, C E., Division Engineer, Post Office Telegraphs, and J. SIVEWRIGHT, M. A., Superintendent, Engineering Department, Post Office Telegraphs. 16mo; pp. 300; \$1.50.

PREScott.—The History, Theory and Practice of the Electric Telegraph. By GEORGE B. PREScott. 12mo; pp., 468; \$2.50.

SPRAGUE.—ELECTRICITY: Its Theory, Sources and Applications. By JOHN T. SPRAGUE, Member of the Society of Telegraphic Engineers. Small 8vo; 384 pp.; \$3.00.

LINE SUPPLIES.

As agents for the sale of the Telegraph Wire manufactured by the Washburn & Moen Manufacturing Co., of Worcester, Mass., we keep a full stock of their wire on hand, both in Chicago, and in Worcester.

We can therefore fill orders for line wire of any size and grade with promptness, and ship from whichever point the lowest freight rate, or the quickest time can be made.

We furnish Line Wire in three grades, as follows:

- I. EXTRA BEST BEST.
- II. BEST BEST, with *Long Lengths*.
- III. Best Best, in ordinary lengths.

I is made from the best iron money can buy, and is better Telegraph wire than is produced by any other concern in the world. There is one joint to the half mile.

II is equal in every respect to the E. B. B. wire of any other manufacturers, one or two joints to the half mile.

III is equal to any ordinary telegraph wire. Pieces running 15 lbs. each.

Either of the above can be furnished BOILED IN OIL, with GALVANIZED JOINTS, or PLAIN with GALVANIZED JOINTS, at a considerable reduction from the price of Galvanized Wire.

For pliability, tensile strength, ductility, conductivity, freedom from flaws and splits, and perfect galvanizing, this wire is superior to all others of the same grades in the market.

The standard breaking strain of superior galvanized wire is two and one-half times its weight per mile.

STANDARD WEIGHT AND RESISTANCE OF GALVANIZED WIRES.

Weight per mile No.		RESISTANCE.	WEIGHT.
6	"	10 ohms	550 lbs.
"	7	12.1 "	455 "
"	8	14.1 "	385 "
"	9	16.4 "	330 "
"	10	20 "	275 "
"	11	25 "	220 "
"	12	32.7 "	168 "
"	14	52.8 "	104 "
"	16	91.6 "	60 "



Galvanized Telegraph Wire	Nos. 6 to 9.	Nos. 10 to 11.	No. 12.	No. 14.	
Extra Best Best					
Best Best, Long Lengths					
Best Best					
Plain Wire, Galvanized Joints					
Extra Best Best					
Best Best, Long Lengths					
Best Best					
Plain Wire, Boiled in Oil, Galv'd Joints					
Extra Best Best					
Best Best, Long Lengths					
Best Best					

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ass., we keep
n Worcester.
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considerable

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is superior to

and wire is two

ZED WIRES.

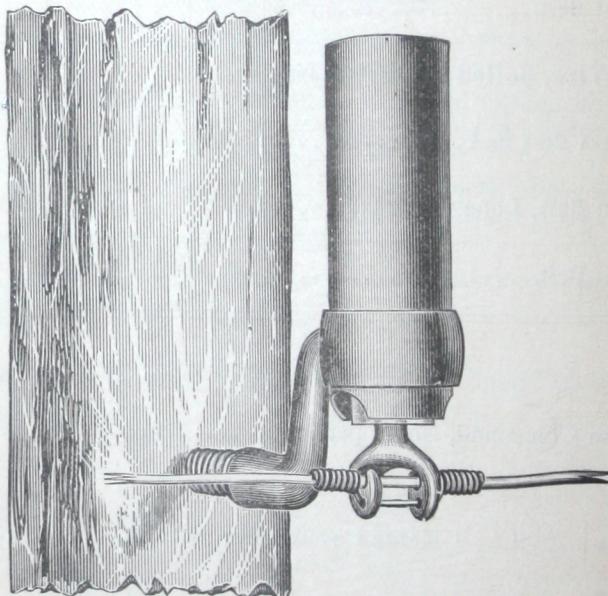
WEIGHT.
...550 lbs.
...455 "
...385 "
...330 "
...275 "
...220 "
...168 "
...104 "
...60 "

American Compound, No. 8, per mile	\$60 00
" " " 7, "	65 00
" " Kerite-Covered, per foot	08

POLES.

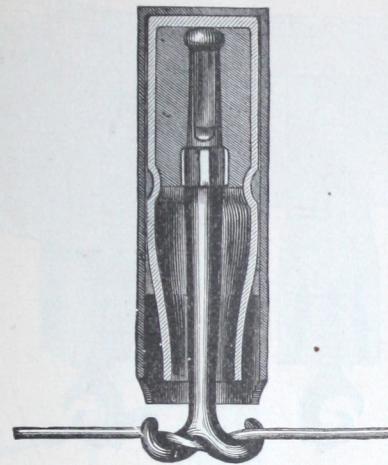
White Cedar.....	TOP 4 Inches.	TOP 5 Inches.	TOP 6 Inches.	TOP 7 Inches.	TOP 8 Inches.
25 feet long.....					
30 "					
35 "					
40 "					
45 "					
50 "					
55 "					

INSULATORs.



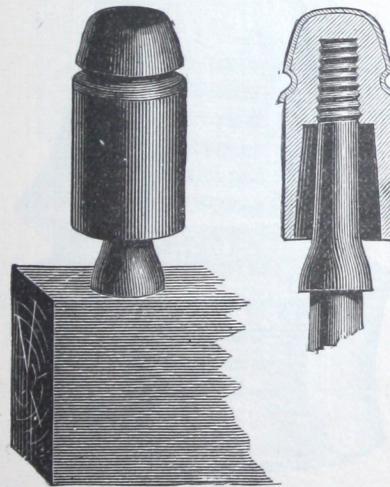
Brooks Screw Shank, with Yates Hook.

Brooks Screw Shank..... \$ 40



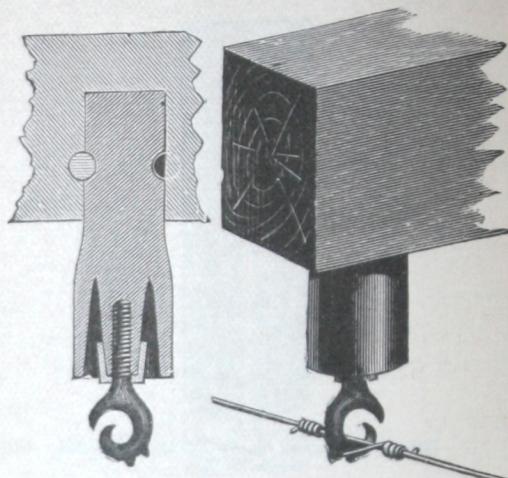
Brooks Cross-Arm Insulator, "S" Hook.

Brooks Cross Arm.....\$ 32



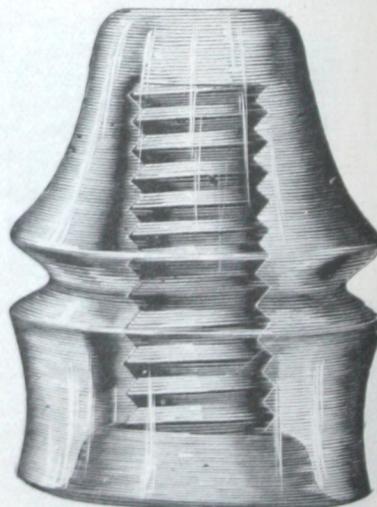
Kenosha Cross-Arm and Pin Insulator.

Kenosha Bracket.....\$ 17
" Pin..... 16



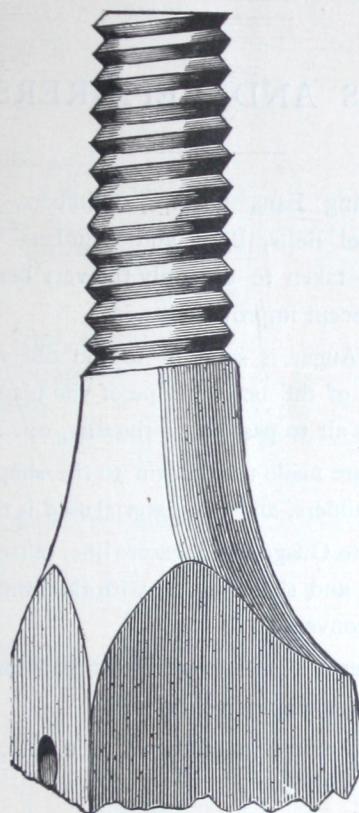
Kenosha Cross-Arm and Hook Insulator.

Kenosha Hook.....	\$ 17
Kenosha Cap for Insulator.....	13



Screw Glass Insulator, Egg Pattern.

No. 1 Screw Glass, Egg Pattern.....	\$ 11
" 2 " W. U. "	10
" 3 " Egg "	10
Hard Rubber, Hook.....	22



Screw Bracket.

Bracket, Screw, plain.....	\$.04
" " painted .....	.05
Pin " plain.....	.04
" " painted.....	.05
Cross Arms, 3 in. x 4 in., per running foot.....	.07 .20
" " " painted " .....	.09 .25
" " Kenosha, 2½ feet, 2 Insulators.....	.50
Bolts and Washers, each.....	.05
Pole Staples, per lb.....	.30
Pole Rings.....	.06
Pole Step Irons.....	.12
Spikes, per lb.....	.05
" " keg, lowest market price.	

BUILDERS AND REPAIRERS TOOLS.

In manufacturing Bars, Clamps, Climbers, Pulleys, Splicing Clamps, Reels, Tool Belts, Body and Climbers' Straps, and other tools, great pains is taken to use only the very best materials and to combine the most recent improvements.

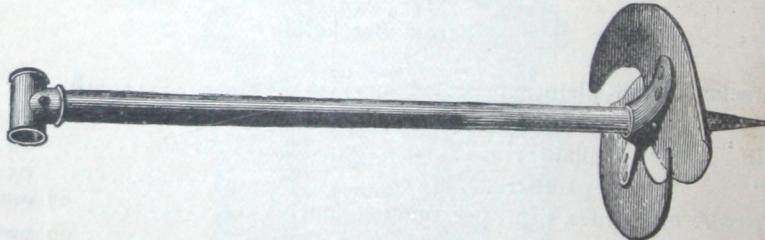
The Vaughan Auger is superior to the old style for use in soft ground on account of the better shape of the blades and the hollow shaft, which permits air to pass under the dirt, obviating suction.

Our Climbers are made to conform to the shape approved by the most experienced builders, and the material used is the best spring steel.

The Patent Wire Guage will measure line, office and magnet wire; also battery copper and sheet metals with the minutest accuracy. It will be found very convenient.

The Patent Plier is an excellent cutting and connecting tool, and takes the place of more expensive articles.

The Splicing Clamp is an indispensable tool, and no repairer's "Kit" is complete without it.



Vaughan's Patent Auger.

AUGERS.

Common Heavy, 10 inch.....	\$ 4 80
Vaughan's, 10 inch.....	7 00
" 11 "	7 50
" 12 "	8 00

BARS.

Crow and Digging.....	2 50
Tamping.....	2 25

CLAMP.

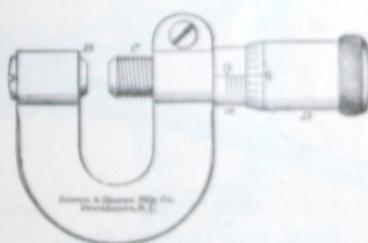
Brass Eccentric.....	2 25
" " with Body Strap.....	3 25
Beach's patent.....	2 50
" " with Body Strap.....	3 50

CLIMBERS.

Extra Spring Steel, per pair.....	\$ 2 50
" " and Straps, ".....	3 50
" " jointed ".....	4 00
" " " and Strapped, per pair.....	5 00

FILES.

12 inch Flat, Bast., per doz.....	6 75
8 " " " ".....	4 00
12 " " half round ".....	7 25
8 " " " ".....	4 25
FILE HANDLES, per doz.....	60



Patent Wire Gauge.

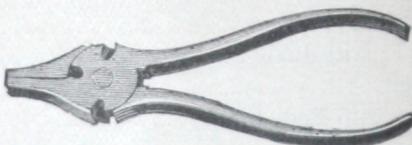
GAUGE.

Patent.....	\$ 5 00
Circular.....	6 00

HATCHETS.

No. 2.....	80
" 3.....	95

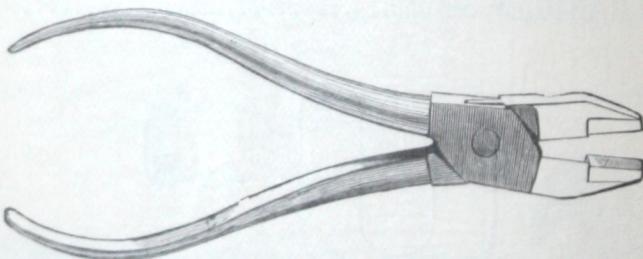
HAND CAR, Light.....	100 00
PULLEYS, Rope and Clamp, complete.....	4 50



Patent Pliers.

PLIERS.

Patent, 4½ inch.....	\$ 90
“ 6 “	1 00
“ 8 “	1 25
“ 10 “	2 00



Stubs Side Cutting Pliers.

Stubs, 6 inch.....	\$ 1 50
“ 8 “	2 50
Plain, side cut and hole.....	1 50
“ with hole in jaws.....	1 00
Common, 6 inch.....	60
“ 8 “	80



Splicing Clamp.

SPLICING CLAMP..... \$2 50

SPLICING WRENCH, Steel..... 75

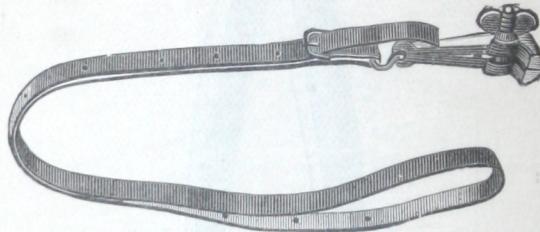
SHOVELS.

Long Handled, per doz..... 15 00

Extra Long Handled, per doz..... 18 00

SPOONS, per doz..... 15 00

SOLDERING APPARATUS, complete.....	\$16 50
Charcoal Fire Pot.....	3 50
Alcohol Torches.....	75c to 2 00
Blow Paper.....	.40c " 75
Soldering Coppers, per pair.....	\$1 50 " 3 00
Solder (fine) per lb.....	35
" (common), per lb.....	30
Soldering Fluid ".....	20
Gutta Percha Bottles, for fluid, 4 oz.....	60
" " " 8 ".....	75
" " " 16 ".....	90



Vise and Strap.

VISES.	
Common, 6 inch.....	\$ 1 00
" " with Strap Loop.....	1 50
" " Straps.....	2 50
Stubs ".....	2 50
" " with Strap Loop.....	3 00
" " Straps	4 00

SAWS.

No. 1.....	2 25
" 2.....	1 75

TOOL SACKS.....

TOOL BELTS.....

TRIMMERS.

Large.....	4 00
Small.....	3 50

REELS.

Pay out.....	10 00
Take up.....	12 00

INSULATED WIRES.

The constantly increasing demand for our Insulated Copper Wire has made it necessary to increase, from time to time, our facilities for covering both Office and Magnet Wire.

Our Wire is drawn from Lake Superior Copper, and under galvanometer tests, shows a conductivity of from 95 to 100 per cent. of pure copper.

Our Office Wire is treated with paraffine whereby the insulation is rendered perfect. It is finished by machinery whereby the surface is POLISHED and the covering COMPRESSED, thus securing the handsomest as well as the most perfectly insulated wire in the market. It will not ravel or slip.

In fine wire there is always a difficulty in accurately designating sizes by the wire gauge. There are two reasons for this difficulty:

- 1st. On account of the variations in the different gauges.
- 2d. On account of the wearing of the dies through which the wire is drawn. The same hank of wire will sometimes show a variation of one-half of a thousandth of an inch, and the wire when closely examined will often have an elliptical shape instead of being round, the difference in diameters being equal to that named above.

DIMENSIONS OF WIRE GAUGE SIZES IN DECIMAL PARTS OF AN INCH.				
No of Wire Gauge.	Size of each No. in decimal parts of an inch of the American Wire Gauge.	No. of Wire Gauge.	Size of each No. in decimal parts of an inch of the Birmingham Wire Gauge.	Size of each No. in decimal parts of an inch of the American Wire Gauge.
0000	.460	19	.03539	.042
000	.40964	20	.03196	.035
00	.36480	21	.02846	.032
0	.32495	22	.02535	.028
1	.28390	23	.02257	.025
2	.25763	24	.0201	.022
3	.22942	25	.0179	.020
4	.20431	26	.01594	.018
5	.18194	27	.01419	.016
6	.16202	28	.01264	.014
7	.14428	29	.01126	.013
8	.12849	30	.01002	.012
9	.11443	31	.00893	.010
10	.10189	32	.00795	.009
11	.09074	33	.00705	.008
12	.08081	34	.0063	.007
13	.07196	35	.00561	.005
14	.06408	36	.005	.004
15	.05707	37	.00445	
16	.05082	38	.00396	
17	.04525	39	.00353	
18	.0403	40	.00314	

DECIMALS EQUALING PARTS OF AN INCH.	
$\frac{1}{8}$	.125
$\frac{1}{4}$	.250
$\frac{3}{8}$	.375
$\frac{5}{8}$	.625
$\frac{7}{8}$	.875
$\frac{1}{2}$	.500
$\frac{9}{16}$	.5625
$\frac{11}{16}$	.6875
$\frac{13}{16}$	.8125
$\frac{15}{16}$	.9375
$\frac{17}{16}$	.96875
$\frac{19}{16}$	.984375
$\frac{21}{16}$	.996875
$\frac{23}{16}$	.9984375
$\frac{25}{16}$	.9996875
$\frac{27}{16}$	.99984375
$\frac{29}{16}$	.99996875
$\frac{31}{16}$	.999984375

In magnet wire a compact, and at the same time a perfect insulation is a matter of prime importance. An actual difference in result, equal to ten per cent, from this source alone, in magnets of fine wire, is often to be found by comparing one instrument with another.

Saving one-half a thousandth of an inch in the thickness of insulation of ordinary relay wire, results in a clear gain of ten per cent to the magnetic power without any corresponding loss.

To remedy this difficulty, we designate sizes by thousands of an inch when accuracy is required. Heretofore we have quoted Office and Magnet Wires by Stubs gauge, but this list is made out by Brown & Sharpe's gauge, which will be our standard hereafter.

The accompanying table shows the diameter in decimals of an inch, of the different numbers of the two principal gauges.

The first three figures to the right of the decimal point give the diameter in "mils."

The English gauge ranges about two sizes higher than the American on Office Wires, as will be seen by comparison.

WEIGHT OF INSULATED OFFICE WIRE.

DESCRIPTION OF WIRE.	No. of Core.	Feet per lb.
Braided and Patent Finished.....	12	41
" Shellacked.....	12	46
" Patent Finished.....	14	60
" Shellacked.....	14	66
" Patent Finished.....	16	90
" ".....	17	06
" ".....	19	132
Wound Double and Paraffined.....	17	140
" Single ".....	17	150
Gutta Percha.....	14	55
".....	19	165
Kerite, $\frac{3}{16}$ in. insulation.....	12	30
" $\frac{1}{8}$ ".....	14	54
" Compound, equal to No. 9 iron.....		27

The above table is approximate, and varies a little with the thickness of the insulation.

We make German Silver Wire, for resistance coils, with double insulation of fine cotton, and with treatment of paraffine, the list price being the same as that of silk-covered copper wire, twenty per cent added.

We solicit orders for Standard Resistance Coils, which we are confident our friends will find as reliable and uniform as the best which are imported.

Liberal discounts to the trade, and to parties who buy large quantities of wire.

OFFICE WIRE.

Wound and braided, paraffined, compressed and polished.

No. 8, per lb.....	\$ 85
" 9, "	85
" 10, "	90
" 11, "	90
" 12, "	95
" 13, "	95
" 14, "	1 00
" 15, "	1 00
" 16, "	1 10
" 17, "	1 10
" 18, "	1 20
" 19, "	1 30
" 20, "	1 40

ANNUNCIATOR AND BURGLAR ALARM WIRE.

Single or double cotton-covered, plain, painted, or paraffined.

No. 8, per lb.....	\$ 60
“ 9, “	60
“ 10, “	65
“ 11, “	65
“ 12, “	70
“ 13, “	70
“ 14, “	75
“ 15, “	75
“ 16, “	75
“ 17, “	80
“ 18, “	80
“ 19, “	80
“ 20, “	85

MAGNET WIRE.

	Cotton-Covered.	Silk-Covered.
No. 16, per lb.....	\$ 75	1 80
“ 17, “	80	2 00
“ 18, “	80	2 10
“ 19, “	80	2 20
“ 20, “	85	2 30
“ 21, “	90	2 40
“ 22, “	1 00	2 50
“ 23, “	1 10	2 60
“ 24, “	1 20	2 70
“ 25, “	1 30	2 90
“ 26, “	1 40	3 00
“ 27, “	1 50	3 20
“ 28, “	1 65	3 40
“ 29, “	1 90	3 55
“ 30, “	2 00	3 70
“ 31, “	2 10	3 90
“ 32, “	2 20	4 05

Finer numbers at special prices.

GUTTA PERCHA WIRE.

No. 12, per lb.....	\$ 1 75
“ 14, “	1 75
“ 16, “	2 50

KERITE WIRE.

No. 12, $\frac{1}{4}$ inch insulation, per foot.....	\$ 09
" 12, $\frac{3}{16}$ " " "	07
" 14, $\frac{1}{4}$ " " "	09
" 14, $\frac{1}{8}$ " " "	06

PLIABLE CORD.

Silk, 2 Strands, per yard.....	20
" 5 " "	30
Cotton, 2 Strands "	12
" 6 " "	18
Silk, Double, for Loops, per yard.....	60
Tinsel, Silk, per yard.....	20
" Cotton, "	15

PLAIN WIRE.

Naked Copper, per lb.....	75
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KERITE.

Tape, per roll.....	2 00
Sheet, per lb.....	3 00

GUTTA PERCHA.

Sheet, per lb.....	3 50
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The following patents relate to office and magnet wire:

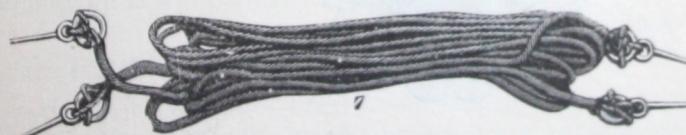
Olmsted, No. 129,858, July 23, 1872.

• Re-issued No. 6954, Feb. 29, 1876.

 " " 6955, " " "

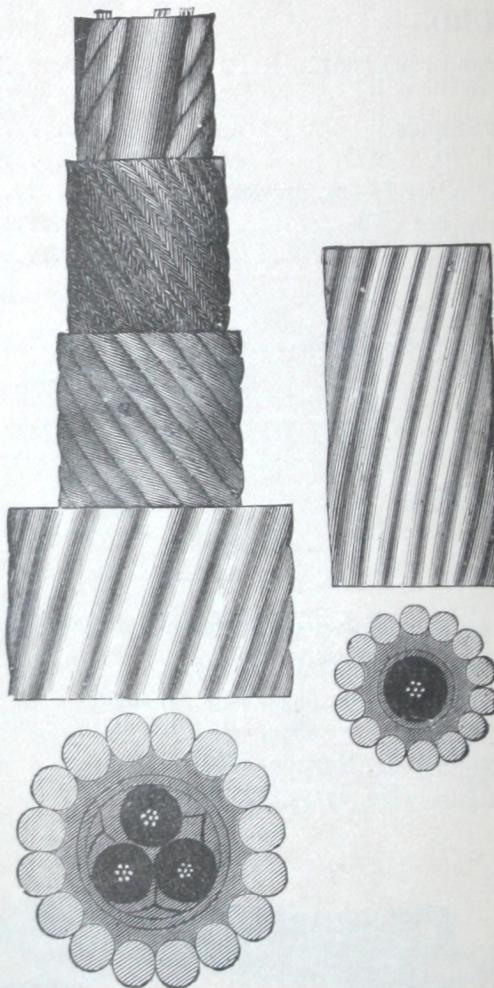
Brooks, No. 45,221, Nov. 29, 1864.

Re-issue No. 2717, Aug. 6, 1867.



Pliable Cord.

SIDE AND END VIEW OF CABLES.



CABLES.

We have recently completed an arrangement which enables us to sell Cables in New York at factory prices, or in Chicago with the addition of freight only. We are therefore prepared to give our customers as favorable terms as can be obtained from any source, and solicit patronage.

SPECIFICATIONS.

NO. 1.—3-CONDUCTOR CABLE.

Each 7 No. 19 copper wires twisted, and insulation $\frac{3}{8}$ in. diameter, with bedding of woven banding and tarred hemp; armor of 14 No. 3 galvanized iron wires, spirally laid. Weighs 13,500 lbs. to the mile. Price, 91c. per foot.

NO. 2.—3-CONDUCTOR CABLE.

Each 4 No. 19 copper wires twisted, and insulation $\frac{5}{16}$ in. diameter, with bedding of woven banding and tarred hemp; armor of 12 No. 3 galvanized iron wires, spirally laid. Weighs 11,450 lbs. to the mile. Price 65c. per foot.

NO. 3.—1-CONDUCTOR CABLE.

4 No. 19 copper wires twisted, and insulation $\frac{5}{16}$ in. diameter, with bedding of woven banding and tarred hemp; armor of 12 No. 7 galvanized iron wires, spirally laid. Weighs 5,046 lbs. to the mile. Price 30c. per foot.

NO. 4.—1-CONDUCTOR CABLE.

7 No. 19 copper wires twisted, and insulation $\frac{3}{16}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 14 No. 7 galvanized iron wires, spirally laid. Weighs 5,850 lbs. to the mile. Price 38c. per foot.

NO. 5.—1-CONDUCTOR CABLE.

7 No. 19 copper wires twisted, and insulation $\frac{3}{8}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 15 No. 9 galvanized iron wires, spirally laid. Weighs 3,550 lbs. to the mile. Price 35c. per foot.

NO. 6.—3-CONDUCTOR CABLE.

Each 7 No. 19 copper wires twisted, and insulation $\frac{3}{8}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 16 No. 3 galvanized iron wires, spirally laid. Weighs 15,100 lbs. to the mile. Price \$1.00 per foot.

NO. 7.—3-CONDUCTOR CABLE.

Each 4 No. 19 copper wires twisted, and insulation $\frac{9}{32}$ in. diameter, with bedding of woven banding and hemp tarred, and armor of 15 No. 5 galvanized iron wires, spirally laid. Weighs 8,170 lbs. to the mile. Price 51c. per foot.

NO. 8.—1-CONDUCTOR CABLE.

7 No. 21 copper wires twisted, and insulation $\frac{9}{32}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 10 No. 7 galvanized iron wires, spirally laid. Weighs 4,050 lbs. to the mile. Price 25c. per foot.

NO. 9.—3-CONDUCTOR CABLE.

Each 1 No. 14 copper wire, and insulation $\frac{1}{4}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 14 No. 5 galvanized iron wires, spirally laid. Weighs 8,000 lbs. to the mile. Price 50c. per foot.

NO. 10.—4-CONDUCTOR CABLE.

Each 4 No. 19 copper wires twisted, and insulation $\frac{5}{16}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 14 No. 3 galvanized iron wires, spirally laid. Weighs 12,715 lbs. to the mile. Price 88c. per foot.

NO. 11.—5-CONDUCTOR CABLE.

Each 1 No. 14 copper wire, insulation $\frac{1}{4}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 14 No. 3 galvanized iron wires, spirally laid. Weighs 12,000 lbs. to the mile. Price 80c. per foot.

NO. 12.—6-CONDUCTOR CABLE.

Each 1 No. 14 copper wire, insulation $\frac{1}{4}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 14 No. 3 galvanized iron wires, spirally laid. Weighs 13,000 lbs. to the mile. Price 85c. per foot.

NO. 13.—7-CONDUCTOR CABLE.

Each 1 No. 14 copper wire, insulation $\frac{1}{4}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 16 No. 3 galvanized iron wires. Weighs 15,056 lbs. to the mile. Price \$1.00 per foot.

NO. 14 7-CONDUCTOR CABLE.

Each 1 No. 14 copper wire, insulation $\frac{1}{4}$ in. diameter, with bedding of woven banding and tarred hemp, and armor of 14 No. 3 galvanized iron wires, spirally laid. Weighs 13,086 lbs. to the mile.

Price 95c. per foot.

NO. 15.—1-CONDUCTOR CABLE.

1 No. 14 copper wire, insulation $\frac{1}{4}$ in. diameter with bedding of woven banding and tarred hemp, and armor of 12 No. 9 galvanized iron wires, spirally laid. Weighs 2,584 lbs. to the mile. Price 25c. per foot.

ON REELS READY FOR SHIPMENT.

Air Cables of any number of Conductors, guaranteed to maintain perfect insulation, to order.

Special prices will be made on large orders.



Learner's and Private Line Instruments.

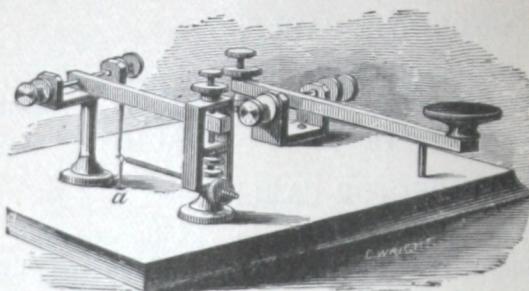
In purchasing an outfit for learning telegraphy it is always expedient to buy the regular Morse Instruments, when the expense can be afforded, because they are used in actual business.

A sounder, key, two cells of battery, one pound of office wire, ten pounds of blue vitriol, and a Bliss Manual, make a complete outfit for the student.

The prices for these articles can be found under the appropriate classifications, and we discount ten per cent from regular prices on them when payment is received with the order.

It frequently happens that the person endeavoring to acquire a knowledge of telegraphy is engaged in other business and can only utilize occasional spare moments for this purpose. To such a person the regular instruments are often inconvenient, and to meet their need, we supply PUTT'S MECHANICAL INSTRUMENT.

This cheap instrument comprises a key and mechanical sounder on one base and requires no battery. It is compact, and can be put away in a drawer or on a shelf at any moment without detaching wires. The key is complete and the sounder gives a distinct sound. By its use persons can readily learn to write and read the Morse Characters. Hundreds of these instruments have been sold. We have recently been appointed sole agents for their manufacture and sale.



Putt's Patent Mechanical Instrument.

Price, including Manual \$5 00

A discount of twenty per cent will be made from the price of Putt's Mechanical Instrument when money is remitted in advance.

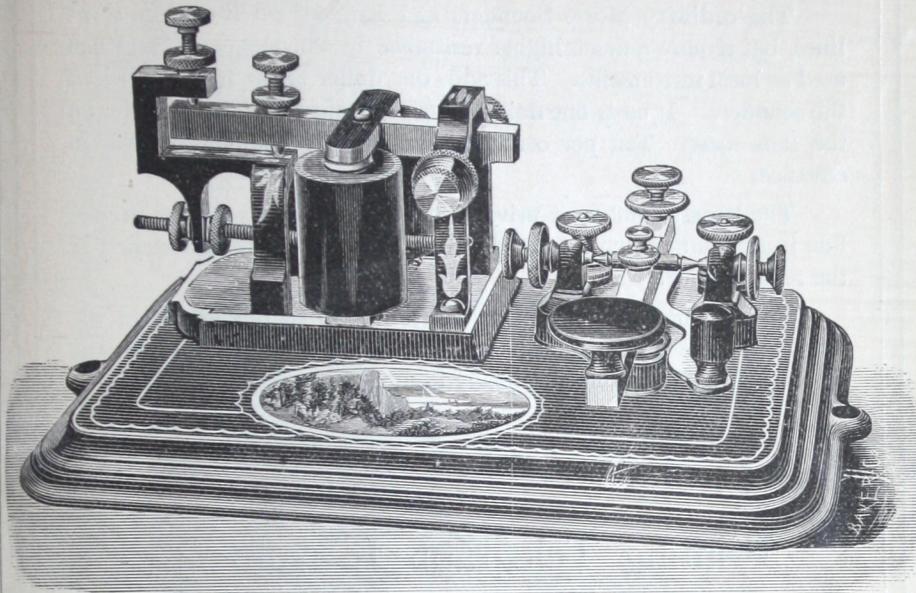
As telegraph and railroad companies supply their own instruments, many persons desire to purchase an outfit for learning which will answer the purpose for the least amount of money.

To supply this demand, we furnish our celebrated PRIVATE LINE OUTFIT, which comprises one private line instrument, one cell Bliss reservoir battery, the necessary chemicals, wire for connections, and a Bliss Manual of Telegraphy. An immense number of these outfits have been sold, and give general satisfaction.

We have just made some important additions to our Private Line Instrument. The improved pattern is far better than the old one, and it is immensely superior to any other private line instrument produced. It now consists of our latest style giant sounder and improved key mounted on an iron base. The binding posts are of the English pattern; the key lever spring is adjustable; the circuit closer is held by a double lip and spring; the sounder gives a clear, loud sound and the base is highly ornamented. The combined instrument is a perfect beauty, and is fit for a parlor ornament.

The Bliss Reservoir Battery, as recently improved by Dr. E. A. Hill, is cleanly, gives a powerful current, and is durable and economical. It runs a long time without attention.

The immense circulation of the Bliss Manual attests its utility, and its popularity is constantly increasing.



Private Line Instrument.

PRICES.

Private Line Outfit, complete.....	\$10 00
" Instrument.....	8 00

A discount of twenty per cent will be made from the price of the Private Line Outfit and Instrument when money is remitted in advance.

Private Lines.

A great many private lines, from one hundred feet to ten miles in length, are being erected for practice and amusement.

Box relays, with keys on base of a cheap pattern, are frequently used on these lines. They correspond in size to the regular patterns described under the head of Morse Instruments. They will be furnished, wound to low resistances, at twenty-five per cent less than the prices for regular instruments, when remitted for in advance.

The ordinary Morse Sounders and Keys are often used on short lines, but require a much higher resistance in the magnets than when used as local instruments. This adds one dollar to the regular price of the sounders. It costs one dollar extra to mount a key and sounder on the same base. Ten per cent discount will be allowed for cash in advance.

The largest number of private lines are equipped with our private line instrument, which we furnish wound to any required resistance at the regular price.

In ordering instruments for short lines, give the length of the line and number of instruments on it. Also, when possible, state the resistance of the instrument already in use.

Printing Telegraph Instruments.

GRAY'S AUTOMATIC PRINTER, of which we are the only manufacturers, is designed for use on Private telegraph lines, and for Police and other Municipal lines.

This instrument is the standard printer of the Gold and Stock Telegraph Co. for private line use.

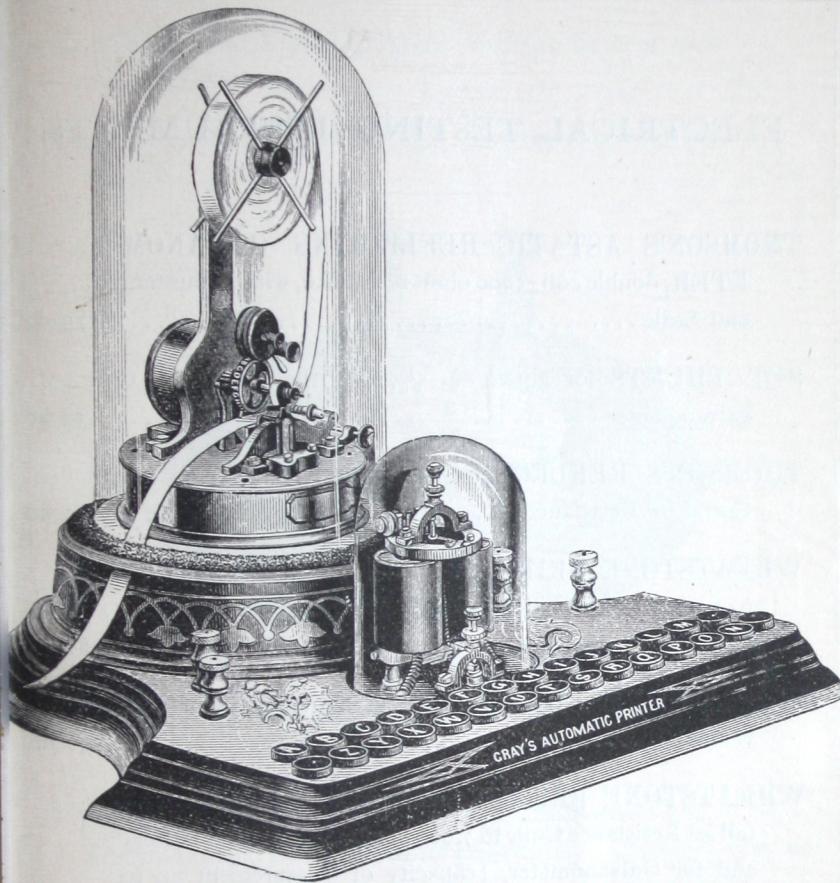
There are several times as many Gray Printers in use in the United States on private lines as of all other kinds combined.

The sending operator prints out his message in plain letters at the distant end of the line, whether the receiving operator is at the instrument or not. The message is also printed by the transmitting instrument.

This printer is self-starting, self-stopping, and self-correcting. Any person who knows how to spell and to read, can use it.

The instrument is specially adapted to meet the needs of manufacturing establishments, iron and coal mines, packers, oil producers, bankers, merchants, street railway companies, and all parties who desire quick, reliable and private communication between distant points.

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Instrument



Gray's Automatic Printer.

The following is an approximate estimate of the expense of equipping a private line of five miles or less with one instrument at each end:

2 Gray's Printers, @ \$160 00.....	\$320 00
2 Patent Cut Outs, 5 00.....	10 00
2 Battery Switches, 1 75.....	3 50
8 Cells, extra size, Callaud Battery, \$1 75.	14 00
15 " Callaud Main " 1 40. 21 00	\$368 50

The above does not include the line material or cost of its construction.

We will contract to build the lines, and place the instruments in operation, whenever desired.

We control the following patents relating to Printing Telegraph Instruments: Gray, No. 132,907, Nov. 12, 1872.

Re-issue No. 6870, Jan. 25, 1876.

" " 6871, " "

" " 6872, " "

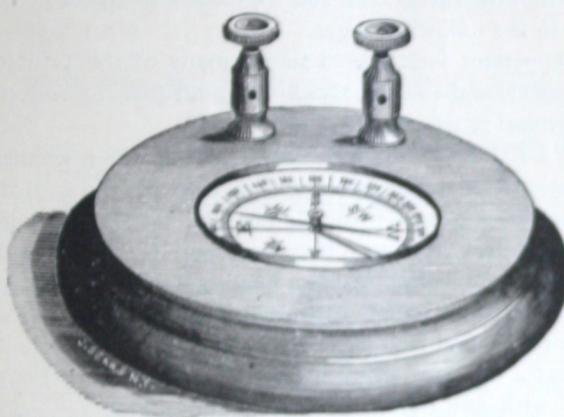
Gray, No. 168,249, Sept. 28, 1875.

ELECTRICAL TESTING INSTRUMENTS.

THOMSON'S ASTATIC REFLECTING GAVANOMETER, double coil, 5000 ohms resistance, with Lampstand and Scale	\$175 00
SET SHUNTS for above, $\frac{1}{9}$, $\frac{1}{99}$, $\frac{1}{999}$ the resistance of galvanometer.....	30 00
THOMSON'S REFLECTING GALVANOMETER, one Coil, Low Resistance.....	100 00
WHEATSTONE BRIDGE, with full set Resistance Coils to 10,000 ohms, with Key for Battery and Galvanometer (capacity of measurement up to 1,000,000 ohms).....	160 00
WHEATSTONE BRIDGE, same as above, without Galvanometer	150 00
WHEATSTONE BRIDGE, Summers' Construction, with full set Resistance Coils to 7,000 ohms, with Key for Battery and for Galvanometer, (capacity of measurement up to 7,000,000 ohms,) compact form.....	100 00
CLARK'S DOUBLE SHUNT DIFFERENTIAL GALVANOMETER.....	100 00
TANGENT GALVANOMETER, with four Coils of Low, Medium and High Resistance.....	100 00
SINE GALVANOMETER, Suspended Needle, with four Coils, Low, Medium and High Resistance.....	100 00
DETECTOR GALVANOMETER, Plain or Astatic Needle, Silk Suspension, for delicate currents.....	50 00

DETECTOR GALVANOMETER, with two Coils of Low
and High Resistance..... \$12 00

DETECTOR GALVANOMETER, Resistance, 100 to 200
ohms..... 10 00



Detector Galvanometer, Low Resistance.

DETECTOR GALVANOMETER, Low Resistance..... 8 00

STANDARD CONDENSER, with Mica Insulation, a
rately adjusted, 1 Microfarad in 4 Divisions..... 175 00

STANDARD CONDENSER, with Mica Insulation, $\frac{1}{2}$
Microfarad, accurately adjusted..... 75 00

CONDENSERS, approximately adjusted, Paraffined Paper
Insulation. Price per Microfarad.....

CLARK'S STANDARD BATTERY CELL..... 15 00

THOMSON'S QUADRANT ELECTROMETER..... 200 00

QUADRANT ELECTROMETER, on Thomson's principle, 40 00

PETTIERS' ELECTROMETER..... 35 00

ELECTRIC ANNUNCIATORS, BELLS, AND BURGLAR ALARMS.

Attention is invited to the various systems of electric calls described in the following pages.

Our apparatus is scattered among many of the principal hotels, business blocks, and valuable dwellings in all parts of America, and is giving universal satisfaction.

GRAY'S ELECTRIC NEEDLE ANNUNCIATOR, which we manufacture, has an international reputation. The face of the indicator has a bright black back-ground; the figures and letters are put on with silver or gold leaf in large characters, and the pointers are nickel plated. This combination makes a handsome appearance, and enables the indications to be quickly discerned from any point in range of the annunciator face, and is superior to the curtain or tag system.

The cases for our indicator can be made of any kind of fancy wood and with any degree of carved and gilded ornamentation to correspond with the plainest or most elaborate surroundings. Our Electric Indicators are rapidly displacing mechanical bells in the old hotels and are universally used in the new ones.

Our Mercurial Fire Alarm System as applied to hotels in connection with the Electric Annunciator, secures an instant alarm at the office in case of fire in any part of the house.

For ELEVATOR ANNUNCIATORS, we control the original Gray and Hahl patents, they being the first inventors to apply the electrical system of floor calls.

Our ELECTRIC BURGLAR ALARM System is the most perfect protection against burglars known.

Our electric HOUSE, OFFICE AND STABLE CALLS are much superior to the old mechanical bells and speaking tube system.

No valuable house should be built without our system of electric calls and burglar alarm protection.

Inasmuch as electric calls are generally operated by persons not versed in the management of electric machinery, it is necessary that the apparatus should be reduced to the simplest, most effective and durable form consistent with the results to be accomplished.

It is also requisite that the wires and circuits should be run in such manner as to protect them from accidental or intentional violence, or from damage by rats and mice and from dampness.

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The many years experience which we have had in this business has enabled us to devise a perfect apparatus and has taught us the best method of insulating the wires and of doing the work. We can introduce our Burglar Alarm or House Call Systems into the most richly furnished, frescoed and inlaid house without leaving a mark or a visible trace of the wires.

We are prepared to absolutely guarantee perfect satisfaction with our apparatus and work.

ELECTRO-MERCURIAL FIRE ALARM.

This system, as perfected by us, is very simple in its design and operation. It consists—

1st. Of Mercurial Bulbs, or Thermostats, placed in the ceilings throughout the building.

2d. Of insulated copper wire, running from the Thermostats to the office of the building, and forming, with the battery, an electric circuit.

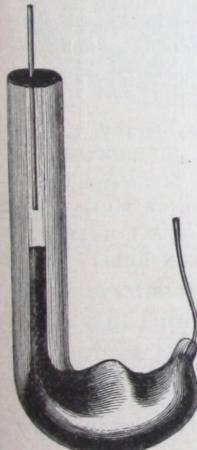
3d. An Electric Annunciator and Bell, placed in the circuit at the office.

When the atmosphere around any Thermostat in the building is overheated, the electric circuit is completed at that point, the BELL RINGS TO DRAW ATTENTION TO THE FIRE, AND THE ANNUNCIATOR SHOWS WHERE IT IS.

The Thermostat consists of a glass bulb filled with mercury, and placed in a metallic shield for protection. The bulb has two upright tubes, in each of which is a platinum wire. In the shorter tube, which is closed, the platinum wire connects with the mercury at all times. In the other, the wire is set above the mercury at that degree of temperature at which the alarm is intended to be given.

As the temperature rises the mercury expands in the tube, until it touches the platinum. This closes the circuit of the battery, which rings the Bell and operates the Annunciator, locating the fire in the building.

The Thermostats are placed in the ceilings, one in every room or closet, in hotels, office buildings and dwelling houses. In all large rooms, such as stores, warehouses and manufacturing establishments, one is placed in every twenty feet, so that in no case can the heat spread over ten feet before its effect will be felt. We generally set the Thermostats at 120° Fahrenheit.



Thermostat.

The Electro-Mercurial Fire Alarm is especially useful in stores, warehouses and manufacturing establishments, in mills and elevators, in schools, colleges and all public buildings, in hotels and office buildings.

In hotels, the Thermostats are attached to the wires of the guest calls, and give the alarm in the office.

As an evidence of the practical character and the great merit of our system of Fire Alarms, the action of the Fire Underwriters of Chicago is here submitted:

OFFICE OF CHICAGO BOARD OF UNDERWRITERS,
CHICAGO, November 10th, 1874.

Western Electric Manufacturing Co.,

GENTLEMEN: At a meeting of this Board held to-day, the subject of your Automatic Fire Alarm was under discussion, and I was authorized to make a reduction of ten cents in rate of premiums where the invention is applied and approved.

Very Respectfully,

ALFRED WRIGHT, Sec'y.

CHICAGO BOARD OF UNDERWRITERS,
CHICAGO, January 28, 1875.

At a meeting of the Board held this day, the following Resolution was adopted, viz.:

Resolved, That the charge for absence of watchmen with watch-clock be removed from the mercantile risks where the electric fire alarm is introduced.

ALFRED WRIGHT, Sec'y.

CHICAGO, December 1st, 1874.

GENTLEMEN: We, the undersigned, Independent Underwriters of Chicago, hereby agree to make a reduction of ten cents per hundred dollars on all buildings and stocks insured by us where your Mercurial Fire Alarm has been placed and is kept in good working order.

TRADERS INSURANCE CO.	M. L. POTTLE.
EMPIRE INSURANCE CO.	S. H. SOUTHWICK.
GLOBE INSURANCE CO.	H. S. TIFFANY & CO.
MERCANTILE INSURANCE CO.	HOPKINS & MCKNIGHT.
E. E. RYAN & CO.	GEORGE & FOLJAMAE.
GEORGE P. TREADWAY & CO.	NEWTON LULL.

ELECTRIC BELLS.

We manufacture a variety of Electric Bells and Gongs in every way adapted for use in connection with calls and alarms.

ESTIMATES.

For the convenience of our friends who may wish to estimate approximately the cost of fitting up a house with Electric Calls, we append the following estimates. The items,—wire, labor and sundry expenses, vary considerably with the style and arrangement of the house. We will make estimates upon application.

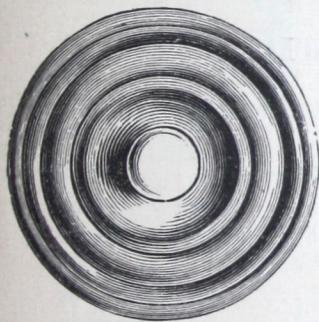
HOTEL ANNUNCIATORS.

ESTIMATE OF COST FOR ONE HUNDRED INDICATIONS.

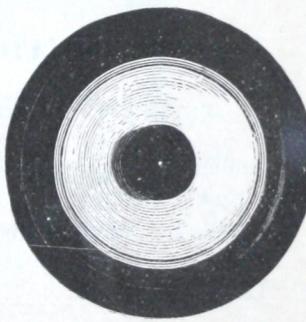
Annunciator, 100 numbers @ \$3 50.....	\$350 00
100 Call Buttons, 50.....	50 00
5 Cells LeClanché Battery, 2 50.....	12 50
1 Vibrating Bell.....	5 00
Wire, Labor and Sundry Expenses, estimated.....	400 00

	\$817 50

Mercurial Fire Alarm Indications in connection with Calls, \$2 50 each.



Rose Wood Call Button.



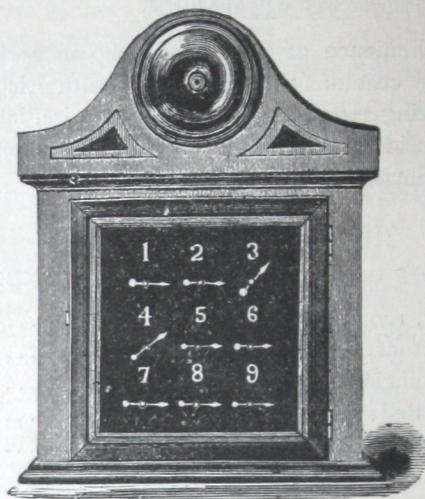
Rubber and Nickel Plated Call Button.

HOUSE CALL.

ESTIMATE OF COST FOR TEN INDICATIONS.

Annunciator, 10 numbers, @ \$4 75.....	\$47 50
10 Call Buttons, 50.....	5 00
1 Front Door Pull,	2 50
5 Cells LeClanché Battery, 2 50.....	12 50
Wire, Labor and Sundry Expenses, estimated.....	35 00

	\$102 50



House Call Annunciator.

ELEVATOR ANNUNCIATOR.

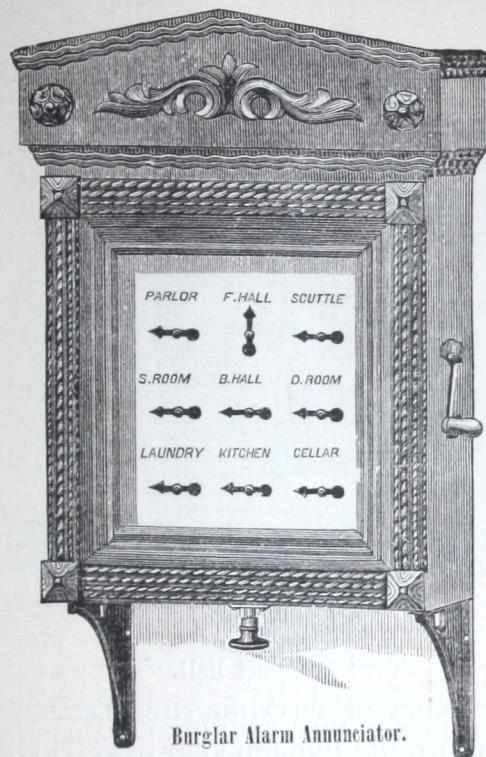
ESTIMATE OF COST FOR FIVE INDICATIONS.

Annunciator, 5 numbers,	@ \$9 00.....	\$45 00
5 Nickel Plated Call Buttons,	1 50.....	7 50
5 Cells LeClanché Battery,	2 50.....	12 50
Cable.....		20 00
Labor.....		15 00
		<hr/>
		\$100 00

BURGLAR ALARM ANNUNCIATOR.

ESTIMATE OF COST FOR NINE AUTOMATIC INDICATIONS.

9 Indications,	@ \$5 75.....	\$51 75
5 Cells LeClanché Battery,	2 50.....	12 50
Door Connections, 3,	2 50.....	7 50
Window " 50,	1 50.....	75 00
		<hr/>
		\$146 75



Burglar Alarm Annunciator.

BURGLAR ALARM SWITCH AND BELL.

ESTIMATE OF COST FOR NINE INDICATIONS.

9 Indications	\$26 00
4 Cells LeClanché Battery, (@ \$2 50.....	10 00
3 Door Connections, set, 2 50.....	7 50
50 Window " 1 50.....	75 00

	\$118 50

Each window sash connected with the Automatic Indicator or the Switch and Bell, is considered one connection.

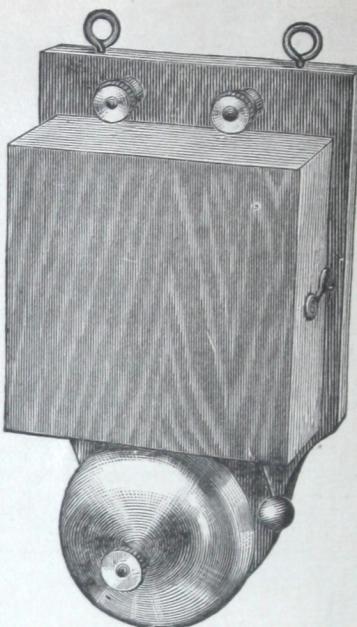
OFFICE AND STABLE CALLS.

ESTIMATE OF COST FOR OFFICE CALLS BETWEEN STATIONS
100 FEET APART.

1 Vibrating Bell.....	\$5 00
1 Call Button.....	50
*2 lbs. Insulated Wire, (@ \$1 00.....	2 00
4 Cells LeClanché Battery, 2 50.....	10 00
Other Wire, Labor and Expenses.....	6 00

	\$23 50

*Kerite Wire for stable call will cost \$7.00.



Breguet Bell.

ESTIMATE OF COST OF PUTTING THE ELECTRO-MERCURIAL FIRE ALARM IN A MANUFACTURING ESTABLISHMENT, FOUR STORIES HIGH, ONE HUNDRED FEET DEEP, AND FORTY FEET WIDE.

8 numbers of Annunciators, @	\$10 00	\$ 80 00
1 14-inch Bell Striker	.....	115 00
5 Cells Callaud Battery,	2 50	12 50
60 Thermostats, set,	3 00	180 00
		<hr/> \$387 00

This estimate is for a number of Annunciator to represent the front and rear of each floor. A smaller or larger Annunciator may be used as desired.

The LeClanchè Battery is best suited for Call systems. Prices are given under the head of BATTERY SUPPLIES.

We make a specialty of Insulated Wire, suited for use in the Call systems. Prices will be found given under the head of INSULATED COPPER WIRE.

The Annunciator prices given include black walnut cases. An extra charge is made for fancy cases, which can be made of any required design and with any degree of ornamentation.

PRICES.



Hotel Annunciator.

ANNUNCIATORS.

House Call, 2 Indications, \$25 00	Burglar Alarm, 2 Indications, \$27 00
" " 4 " 30 00	" " 4 " 34 00
" " 6 " 33 00	" " 6 " 39 00
" " 8 " 40 00	" " 8 " 48 00
" " 9 " 42 75	" " 9 " 51 75
" " 10 " 47 50	" " 10 " 57 50
" " 12 " 51 00	" " 12 " 63 00
" " 15 " 63 75	" " 15 " 78 75
" " 20 " 75 00	" " 20 " 95 00
Mercurial Alarm, per Indication.....	10 00
Elevator, "	9 00
Hotel, 20 Numbers, and upwards, per Indication.....	3 50

BURGLAR ALARM SWITCH.

Size 2 Indications.....\$13 50	Size 10 Indications.....\$28 75
" 4 " 17 00	" 12 " 31 50
" 6 " 19 50	" 15 " 39 50
" 8 " 24 00	" 20 " 47 50
" 9 " 26 00	.....

BURGLAR BATTERY SWITCH.....	1 00
" ALARM DOOR CONNECTOR.....	1 50
" WINDOW "	25
" FLOOR "	50

BELLS, VIBRATING.

Walnut Case, 2½ inches.....	3 50
“ “ 3 “	4 00
Mahogany Case, 3 “	5 00
Iron “ 3 “	5 00
Mahogany “ 7 “	15 00
Skeleton Form, 4 “	6 00
Relay “ small.....	8 00
“ “ large.....	18 00
*Skeleton Form, Lock Attachments.....	9 00
† “ “ Continuity Attachment.....	9 00
†Iron Case, Needle Attachment.....	8 00

BELLS, SINGLE STROKE.

Mahogany Case, 3 inches.....	5 00
Iron “ 3 “	5 00
Mahogany “ 7 “	15 00
Skeleton Form, 4 “	6 00
Relay Form, small.....	8 00
“ “ large.....	18 00
Striker, actuated by weight, 14 inches.....	115 00
“ “ “ 16 “	125 00

BUZZER.....	6 00
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SCALL BUTTON, or ROOM KEY, polished wood.....	50
“ “ “ “ metal and nickel plat'd, 1	50

FRONT DOOR PULL, Farrar pattern.....	2 50
“ “ “ Hill “	2 50

SIGNAL KEYS.

Small, Back Contact.....	2 25
“ Front “	2 50
“ Back and Front Contact.....	3 00

THERMOSTATS	1 50
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*The Lock Attachment prevents any movement of the bell hammer till it is actuated by the magnets. This bell is used on railroad trains.

†The Continuity Attachment causes the bell to continue ringing several seconds after the current on the line wire has ceased. It is useful wherever a prolonged call is needed.

‡The Needle Attachment shows whenever the bell has been rung till restored mechanically. It is useful where the person called is liable to be absent temporarily.

§Our Room Keys are made of rosewood, mahogany, walnut and ebony.

We control the following patents relating to the foregoing class of instruments.

ANNUNCIATORS.

Gray, No. 118,231, Aug. 22, 1871.
Re-issue, No. 6,825, Dec. 28, 1875.
Gray, No. 162,057, April 13, 1875.
Hill, No. 114,007, April 25, 1871.
Re-issue, No. 6575, Aug. 3, 1875.
Re-issue, No. 6577, Aug. 3, 1875.
Lewis, Design, No. 8999, Feb. 15, 1876.
Hill, No. 176,784, May 2d, 1876.

ELEVATOR ANNUNCIATORS.

Hahl, No. 148,447, March 10, 1874.
Gray, No. 172,093, Feb. 1, 1876.

BURGLAR ALARMS.

Page, No. 76,654, April 14, 1868.
Re-issue, 4588, Oct. 10, 1871.
Guest, No. 79,973, July 14, 1868.
Blunt, No. 79,440, June 30, 1868.

ELECTRO-MERCURIAL FIRE ALARM.

Page, No. 76,654, April 14, 1868.
Re-issue, No. 4588, Oct. 10, 1871.
Guest, No. 79,972, July 14, 1868.
Guest, No. 79,973, July 14, 1868.
Hill, No. 114,007, April 25, 1871.
Re-issue, No. 6577, Aug. 3, 1875.
Hill, No. 176,784, May 2d, 1876.

Other patents applied for.

ELECTRO-MEDICAL APPARATUS.

The use of Electricity as a remedial agent is rapidly on the increase. Great advancement in the method of application is constantly being made, and to keep in accord with this progress we attempt to devise and to supply the medical profession with the best and most recent apparatus for treatment with the Galvanic and Faradaic currents and for the Galvano-Cautery.

CONSTANT BATTERY.

For Electrolytic treatment the Hill and Callaud Galvanic Gravity Batteries are the most widely known and generally used by the medical profession. They are as compact as any of the sulphate of copper batteries, give a constant, uniform current, and for medical use require little attention and consume only a small amount of materials. Wherever the battery can be permanently located, as for office treatment, they are the favorites. Batteries of twenty-five, fifty, seventy-five, or one hundred cells are usually purchased according to the needs of the physician. The prices of the various sizes of these batteries can be found under the head of Battery Supplies.

MANIPULATING SWITCH.

The BLISS MANIPULATOR, sold for use in connection with the Galvanic Battery, enables the operator to connect his entire battery in single or compound series. It permits the selection of any portion of the battery for use, and combinations of any number of cells within the limits of the battery can easily be arranged for either the intensity or quantity current.

RHEOSTATS AND SHUNTS.

We manufacture Rheostats or Resistance Coils and Shunts varying from one to ten thousand ohms and fractional parts thereof, for use in modifying the Galvanic or Faradaic currents.

GALVANOMETERS.

We manufacture Galvanometers with intensity and quantity coils for determining the tension and quantity of the Galvanic currents, which enable the operator to know to a certainty the quality of the current he is using. Prices are given under the head of Testing Instruments.

RHEOTOME.

We manufacture a Rheotome for breaking the constant battery current. The speed of the clock work can be regulated at pleasure. A key attachment is provided for hand action. By the use of this instrument, short, prolonged, slow or rapid successive shocks can be given.

ELECTRO-FARADAIC APPARATUS.

Faradaic electricity is used to a larger extent in the treatment of disease than any other variety. The cures of nervous and chronic diseases effected by this agent are numerous. The multiplication of electric bath establishments of late has been rapid.

BATH APPARATUS.

The Faradaic Bath Apparatus manufactured by us is very complete, efficient and justly celebrated. It is the out-growth of an immense number of experiments, and has stood the test of several years of practical use in the hands of many of the most expert practitioners of the day, and with the best results.

In the apparatus as now manufactured, the induction coil, vibrator magnet, switch connections and binding posts are inclosed in a handsomely polished case, sixteen inches in length, fifteen inches wide and fourteen inches high, where they are entirely free from dust or liability to accident, and will last for years without repairs. The connections are made in the most substantial manner. A door on the side of the case permits examination at any time.

The primary and secondary wires in the coil are proportioned in length and size so as to produce a quantity current very powerful in

its character. It penetrates to the innermost fibre and tissue of the body, and is free from the acute and inflammatory character to be met with in many kinds of bath apparatus.

We have on file abundant testimony as to the merit and superiority of our coils.

The external metal work on the front of the case is finely polished and nickel plated.

On the face of the case will be found the plunger or shield, the primary switch, the commutator, the galvanometer and the secondary switch, the vibrator, the bank of electrode switches, and binding posts for the dry current both primary and secondary.

The shield is nickel plated and graduated. The current increases in strength as it is withdrawn from the coil. By its intelligent use any strength of current can be utilized, from one nearly imperceptible to the taste to one so powerful that the strongest person can with difficulty endure it.

The primary switch controls the action of the battery and throws the current on and off in the primary coil.

The commutator reverses the polarity of the primary current, and consequently that of the secondary, at pleasure.

The galvanometer and switch enable the operator to test the battery at pleasure and to know the strength of the current which is being used.

The secondary switch throws the induced current on and off from the bank of electrode switches.

The vibrator is adjustable and is arranged on the harmonic principle. It can be made to vibrate any number of times per second within the range of the instrument, thereby controlling the length and rapidity of the pulsations of the induced current, which is of importance in the electric bath treatment.

The bank of electrode switches, 12 in number, are arranged in two rows running from top to bottom on the left side of the front of the case. The left hand row, labeled 1, are connected with the electrodes at the head and on the front side of the tub. The right hand row, labeled 2, are connected with the electrodes at the foot and on the back side of the tub. The two upper electrodes are also labeled Head and Foot; the second two, Shoulder; the third couple, Chest; the fourth, Hip; the fifth, Thigh; and the sixth, Knee.

By means of these switches, the faradaic current can be directed through the patient in any direction, and its polarity controlled at will. When a switch is half out (a line on the rod showing the position) its electrode is disconnected; when it is pushed back firmly the positive current is taken; when pulled firmly forward the negative current is taken. Hence by reversing the position of the two electrodes in use the direction of the faradaic current is changed accordingly. It is not customary to pass the current through more than two of the electrodes at once, but it can be done when desired. The electrodes in the tub are intended to be placed so that they will come opposite the parts of the patient for which they are labeled. When desirable the position of the patient can be changed in the tub by the use of a foot rest.

The dry primary current can be taken from the two upper binding posts by means of pliable conducting cord and handles.

The dry secondary current can be taken from the two lower binding posts in the same manner. It is sometimes convenient to apply the secondary current to the patient in the bath by means of a pliable cord and sponge, or by hand rubbing.

BATTERY.

The battery used in connection with the bath apparatus is a single gravity cell 20 inches in diameter, the elements of which are connected to the primary binding posts inside the case. To start the battery, place the zinc in position, dissolve twenty-five lbs. of sulphate of zinc in sufficient water to make a solution that will cover the zinc, and pour into the cell; drop one-half pound crystals of blue vitriol into the bottom of the cell through the openings in the zinc. The battery is then ready for connection and immediate use. It gives a constant, powerful current. The battery sometimes runs for two years without taking down. All the attention required is to feed occasionally with one-quarter pound of sulphate of copper, and fill up with water to replenish the loss by evaporation. The action of the battery increases the sulphate of zinc in the solution and the accumulation may be removed once in six months by taking out one-quarter of the liquid in the cell and filling up with water.

ELECTRODES.

All the tub Electrodes are highly finished except the head plate. The head Electrode is a sheet of metal placed under a perforated head board. The practitioner, in using the head Electrode, places over the

head-board a rubber cloth folded to such a size as will permit a proper amount of current acting upon the patient. The rubber being a non-conductor, it prevents too violent action upon the head, (which is very sensitive,) and can readily be adjusted to the strength of the patient. The shoulder and hip Electrodes are usually made $2\frac{1}{2}$ inches in diameter, the chest 3 inches, and the thigh, knee and foot Electrodes $1\frac{3}{4}$ inches.

TUB.

The Tub is usually made 6 ft. 4 in. long at the top, 4 ft. 6 in. on the bottom; 16 inches wide at the foot and 21 inches at the head, with a slight taper toward the bottom.

The Tub is made of wood, soapstone or porcelain tile, either plain or ornamented. The water used in the tub is warmed to suit the purpose of the bath. Pure water is generally used, but by adding a little salt, or acid, the conductivity of the water is increased, which decreases the electrical effect, as more of the current passes around instead of through the patient. This is necessary in the treatment of very debilitated patients.

In starting the apparatus it is usual to switch on the primary current and get the vibrator into perfect action with the proper vibration before switching on the secondary current.

PLUMBING FIXTURES.

In quoting prices for the bath apparatus we have made no allowance for the cost of waste pipe and other plumbing fixtures, for which estimate is made to suit each particular case, but that work can easily be done by any plumber, under proper instruction.

We are confident there is no Electro-Medical bath apparatus manufactured which can compare with ours for completeness and efficiency.

We are always ready to impart special information desired upon any point not herein explained.

We will vary our apparatus from the regular pattern to meet the wishes of any customer at a corresponding alteration from list rates.

POCKET INDUCTION MACHINE.



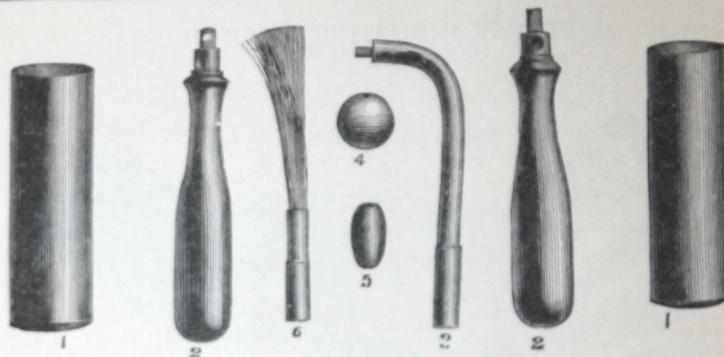
To meet the need of the physician and family for a cheap, compact, portable, cleanly and powerful Electro-Faradaic Machine, we manufacture our Pocket Induction Machine, with Bi-Sulphate of Mercury Battery, which furnishes the practitioner with an induced or Faradaic current of great power, in so compact a form that it may be carried without inconvenience—its weight being but 21 ounces, the case measuring $7\frac{1}{2}$ inches long by 4 inches wide, and $1\frac{1}{2}$ inches thick. The Battery of two cells is charged with the Bi-Sulphate of Mercury. It is perfectly clean and neat in all its parts, having no free acid, and in its action giving rise to no odor.

The whole machine is made in the most perfect manner, and does not readily get out of order.

The available strength of current from this battery is fully equal, cell for cell, to that from the six-inch Callaud or Daniell Battery; its electro-motive force is about ten per cent. greater, and its internal resistance only a trifle in excess of the various forms of sulphate of copper battery with gallon jars.

The cores of our induction coils are of the purest iron, and the coils of pure Lake Superior copper-wire. The length of the primary wire is such as to give the greatest magnetic effect with the battery employed. The secondary wires are drawn very fine, and the insulation is as perfect as possible.

Coils made in this manner, one inch in diameter, and three inches long, actuated by two cells of battery, produce an induction current of more intensity than a man can bear.



A set of Electrodes (shown in cut), suitable for the application of the Faradaic current and a bottle of the Bi-Sulphate of Mercury go with each machine, and are all contained in the case.

The whole constitutes a powerful and unsurpassed Electro-Medical apparatus for the practitioner, combining all the qualities of any Faradaic or induced current machine (ordinarily so heavy and cumbrous, and attended with so many objectionable features,) in a neat, compact Pocket Battery.

This Battery gives three currents:

- 1st. The EXTRA CURRENT (induced in the primary coil).
- 2d. The SECONDARY CURRENT.
- 3d. The TWO TOGETHER.

These currents, although the same in kind, allow of a series of increasing effects, perfectly under control, beginning so mild as to be imperceptible, and gradually increasing until they reach a great intensity.

TO CHARGE THE BATTERY: Take off the movable plates of zinc, and place in each portion of the trough two spoonfulls of the Sulphate of Mercury. Then put in a sufficient quantity of water to come up to the under surface of the zincs, and replace the zincs in the trough.

To OPERATE the MACHINE: Raise the lever so that the platinum point comes into contact with the spring circuit breaker. When the lever is moved back again the action of the battery ceases.

The **EXTRA CURRENT** is obtained when the cords are in holes 1 and 2;
The **INDUCED CURRENT**, when the cords are in holes 2 and 3;
The **TWO TOGETHER**, when the cords are in holes 1 and 3.

The cord which is in the hole nearest P is the positive and the one in the hole nearest N is the negative terminal.

The slot in the top of the trough should always be on the same side as the letter S, which will be seen on the box, otherwise the direction of the current will be reversed.

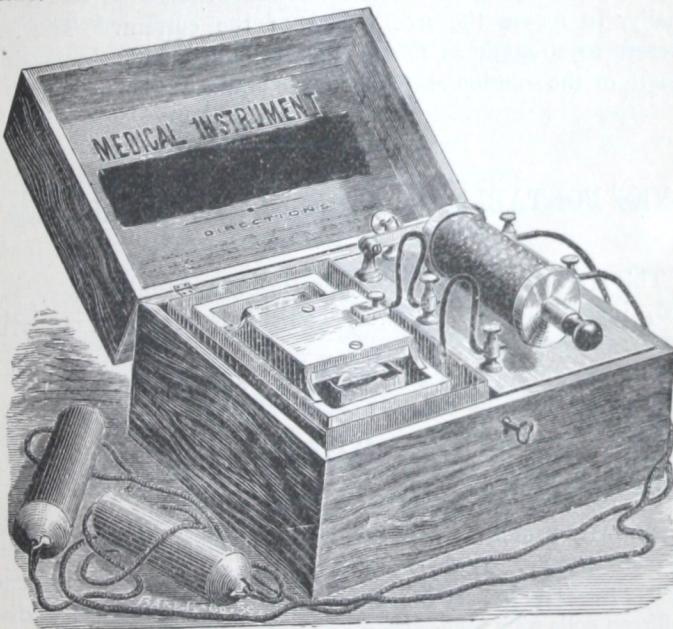
If the zincs are taken out and the solution stirred once in every ten or fifteen minutes, the strength of the current will be increased.

The sitting being ended, do not put away the battery without having emptied and washed the trough, which may then be placed without injury in its proper place.

The battery runs without being recharged during a sitting of one hour, or two sittings of one-half hour each.

ELECTRO-MAGNETIC MACHINE.

We also manufacture for the physicians' and for family use an Electro-Magnetic Machine, with Sulphate of Copper Battery. The case is substantially made of black walnut, and polished. The coil has a vibrator and metal shield regulator, two hand electrodes and one foot plate with pliable cords, which are furnished with each machine. Connections for the secondary current only are furnished on this machine.



Electro-Magnetic Machine.

DIRECTIONS.

SOLUTION.—Dissolve one ounce of sulphate of copper in one pint of soft water; place the zinc in position so that it does not touch the copper at any point; nearly fill the copper cup with solution. The

instrument should be placed in the box so that the plunger points towards the front; the primary binding posts will then be next to the battery, and the secondary on the right hand of the coil. Connect the zinc and copper poles of the battery to the primary binding posts, and the handles to the secondary posts. Adjust the set-screw at the back of the coil, until the breaker vibrates rapidly, and the instrument is ready for use.

A moist sponge inserted in the handles assists in the application of electricity.

Never allow the zinc to remain in the solution when through using the instrument. The zinc should be scraped and carefully cleaned after each using.

The solution can be kept in a common bottle, and be used several times by adding a little more sulphate of copper. Keep the solution from the clothes, and out of the reach of children.

The platina point in the circuit breaker should be cleaned occasionally, to secure the free action of the current. The current increases in strength as the plunger is pulled out. Increasing the strength of the solution also adds to the power of the current.

HAYES' PORTABLE GALVANO-FARADAIC APPARATUS.

This is a complete portable apparatus, comprising battery, switch-board, induction coil, vibrator, commutator, current interrupter, rheostat, and galvanometer.

The black-walnut case in which the apparatus is inclosed is 17 inches long, 11 wide and 12 deep. The box is dovetailed and strengthened by metal bands. It is well finished, provided with locks and a suitable handle.

The battery is located in the bottom of the case. It is arranged on the gravity principle, and can be used as a single element or as a compound battery. It does not require the use of acids to generate the current. The battery box is made of hard rubber, and is divided into fifteen cells nine inches long, one wide and two and one-half deep.

The copper plate is placed at the bottom; then a layer of blue vitriol covered with a sheet of blotting paper; then a layer of sawdust; and, finally, the zinc plate. The whole is saturated with a solution of sulphate of zinc.

There is no liquid to spill.

The battery will run for at least six weeks with daily use.

When the cover is removed the manipulating apparatus is exposed to view. It is handsomely finished in rosewood, hard rubber and nickel plated metal.

The induction coil is 7 inches long and $3\frac{1}{2}$ inches in diameter. It is covered with a nickel plated shield. The nickel plated plunger is graduated for regulating the induced current with accuracy.

The harmonic vibrator is adjustable, and controls the pulsations of the secondary current.

The switch board consists of forty-three angle pieces and blocks, so arranged and connected by means of metal-tipped plugs that the whole fifteen cells of battery can be connected as a single element, as a compound battery of fifteen or less cells, or as a compound battery of five or less cells with the quantity of two or three cells.

The battery is connected as a single element for generating the induced current.

The number of cells in use can be increased from one to fifteen, or vice versa, without breaking circuit when desirable.

Additional plugging blocks are provided for passing the primary and secondary currents direct to the binding posts or through the commutator, current interrupter, rheostat, or galvanometer.

The commutator reverses the current; the interrupter breaks the current; the rheostat modifies the current either in the direct or an accessory circuit, and has a capacity from ten to one thousand ohms; and the galvanometer shows the direction and strength of the current.

There are sixty nickel plated and rubber plugs for use in making the various combinations.

The handles, conducting cord and electrodes are complete for general practice.

To those familiar with the principles which underlie the use of electricity as a therapeutic agent, this apparatus will be found simple, comprehensive and indispensable.

THE GALVANO-CAUTERY BATTERY.

The Galvano-Cautery Battery which we manufacture consists of four three gallon cells; each cell contains four carbon and three zinc plates, six by nine inches. The exciting fluid used is the Bi-Chromate of Potash solution, and one mixture will last through several operations.

This battery is inclosed in a good, or when preferred, an elaborately finished case, three feet in height and two and one-half feet square. An arrangement is provided for raising and suspending the elements above the solution when the battery is not in action, thus preventing waste.

On the top of the case, nickel plated switch plates and plugs are so arranged that a single cell or all the battery can be used for either the intensity or quantity current. It also permits the selection of any particular portion of the battery for use. These changes can be made instantly. The battery generates an immense quantity current sufficient for the longest operation. One-half of the battery is usually sufficient for an operation, so that there is a large reserve power for use in protracted cases.

It is needless to dwell here upon the advantages of the Galvano-Cautery in Surgery, but the profession can be assured there is no superior battery to the above to be obtained.

NORMAL GALVANIC BATTERY.

Among physicians who do not have an extensive practice in surgery, a battery is needed for general treatment, and when required for cautery or the excision of tumors.

We call attention to the superiority of the Normal Battery for therapeutical and surgical purposes. It can be changed for quantity or intensity, and supplies a want among those who do not make electricity a specialty, or do not want to be at the expense of keeping several batteries for the different operations.

In some powerful batteries containing strong acids there is rapid decomposition of material, which causes the accumulation of salts. These corrode the connections upon which they are deposited, and the battery is rendered useless. The difficulty is aggravated when no provision is made for the separation and cleaning of the parts and when their connections are so hidden from sight that it requires an experienced electrician to locate a difficulty.

In the Normal Galvanic Battery, these defects have been almost entirely remedied.

There are no screws to become corroded, weakening or breaking the connections. The connections can easily be cleaned. Every part is in full view of the operator. There are no complicated parts to become disarranged.

The elements may be immersed in the solution to any depth, thereby regulating the quantity of the current.

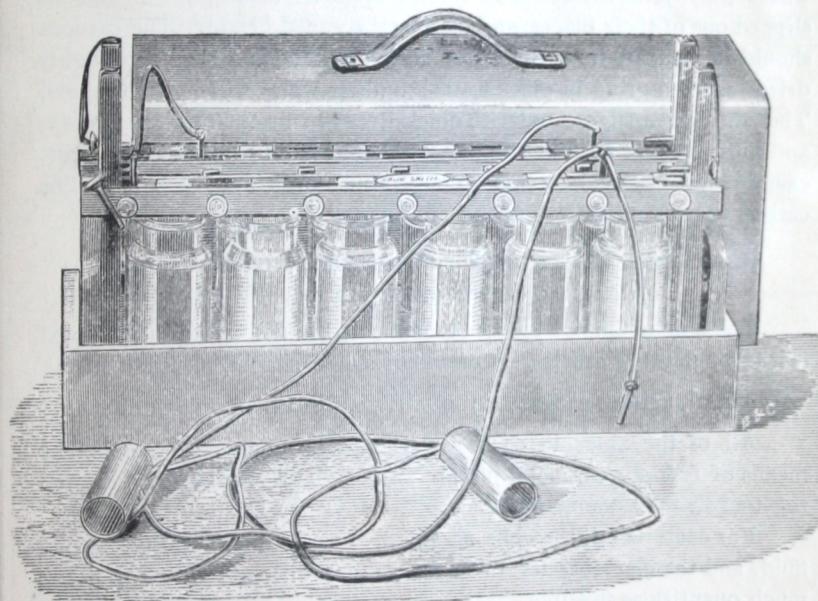
As few of the cells can be used as desired without immersing the remainder in the solution, thereby saving material.

An accident can be remedied by almost any person, however unskilled. If a jar is broken, one can be had at any drug store or physician's office.

This battery consists of zinc and carbon elements, with an exciting solution of bichromate of potash and sulphuric acid.

The zincs, carbons and connections are held in position and insulated by means of prepared wood strips and metal bolts combined so as to form a clamp and support that may easily be taken apart.

The following cut shows the design of the Normal Battery admirably. It is easily transpor



These batteries are substantially made and put up in neatly finished black walnut cases, with conducting cords and handles.

TO UNPACK AND ARRANGE THE BATTERY FOR USE.

Pull out the metal pins at each end of the box, and lift the cover off; draw out the pins that are in the posts at each end; lift out each

row of elements, and take the packing out of the cells. Put Battery Fluid into the cells until they are about half full. Be careful not to spill any of the fluid in the box or on the connecting cords. Place the pins in the posts at such height as will keep the elements just out of the fluid.

The different rows of cells are connected at the ends, by means of metal cords. Any number of cells may be used by pushing the brass piece on the conducting cord, between the connectors and the middle wooden strip, at any point you wish to make connection. When ready to operate, lower the elements a short distance into the fluid (say $\frac{1}{2}$ inch), sustaining them there by means of the pins.

When the battery works weak from use, add some new solution to the old, or put in new. Do not let the elements remain in the solution when not in use. Should the metal connections become corroded where they join the carbons, let the bolts be loosened, the carbons slipped out of their places, and the metal scraped bright. The carbons should be soaked in warm water until cleaned, and then thoroughly dried before putting in place again; boiling water will not hurt them. The zincs are amalgamated with quicksilver when sent from the factory, and must be kept so. If the battery should fail to work at any time, examine all the connections, connecting cords and carbons. The carbon pole is positive, and the zinc negative.

TO ARRANGE THE BATTERY FOR INTENSITY, OR AS USED FOR
GENERAL TREATMENT.

The zinc of one cell must be connected to the carbon of the next cell throughout the series, by means of staple shaped pieces of metal.

TO ARRANGE THE BATTERY FOR QUANTITY, OR AS USED FOR CAUTERY.

All of the zincs in each row should be connected together by means of fork-shaped metal pieces. The carbons should be connected together in the same manner.

For cauterizing, the cells should be nearly filled with new strong fluid, and the elements let in as far as they will go; this is to get as much quantity as possible.

FOR BATTERY FLUID.

To One Pint of water add gradually Four Ounces by measure of sulphuric acid—the mixture will become hot; now put in Two Ounces by weight of bichromate of potash, pulverized; stir it frequently until dissolved—when cold it is ready for use. An earthen vessel should be used to make the fluid in.

PRICES.

BATH APPARATUS.

Complete, with Instrument in good case, Battery and Wood Bath Tub.....	\$230 00
Complete, with Instrument in elaborate case, Battery and Porcelain Tub.....	380 00
Instrument only, good case.....	175 00
" elaborate case.....	250 00
Tub, Wood.....	25 00
" Soapstone.....	75 00
" Porcelain.....	100 00
Electrodes, per set.....	15 00
Battery, Cell complete, Hill, 20 inch.....	15 00
" Zinc.....	7 50
" Jar.....	9 50

POCKET INDUCTION MACHINE.

Machine, complete, including Conducting Cords, two insulated Handles, a spherical and olive shaped Elec- trode, a Metallic Brush, and a bottle of Bi-Sulphate of Mercury, all contained in the case.....	12 00
Instrument only.....	9 00
Battery, two cells.....	1 50
Electrodes, per set.....	3 00
Bi-Sulphate Mercury, per oz.....	20

ELECTRO-MAGNETIC MACHINE.

Complete, Coil, Battery, Cord, Handles and Foot Elec- trode.....	10 00
Battery.....	2 00
Electrodes and Cords.....	2 00
Coil.....	6 00

BATTERY MANIPULATOR—BLISS PATTERN.

Capacity, 25 Cells.....	50 00
" 50 ".....	100 00
" 75 ".....	150 00
" 100 ".....	200 00

GALVANO-CAUTERY BATTERY.

Good case	175 00
Elaborate case	250 00
RHEOTOME	15 00

NORMAL BATTERY.

No. 1, consisting of twelve cells—suitable for operations upon the eye or ear	28 00
No. 2, consisting of sixteen cells	33 00
No. 3, consisting of twenty-four cells—suitable for general use	40 00
No. 4, consisting of thirty-two cells—very powerful—suitable for physician's office	50 00

HAYES' GALVANO-FARADAIC APPARATUS..... 300 00

ELECTRODES.

Insulating Handles, pair	\$ 75
Metal Sponge Holders, pair	1 00
Metal Brush	75
Olive Holder, with set olives	1 00
Sponge Covered Electrode	2 00

Electrodes to order, many varieties.

Induction Coils and Electro-Medical Apparatus of any desired style or capacity to order.

Pliable Cord (see Insulated Wire), page 49.

The following Patents relate to Electro-Magnetic Apparatus :

Page No. 76,654, April 14, 1868.

Re-issue No. 4,588, Oct. 10, 1871.

GAS LIGHTING.

Having acquired control of the Hill system for lighting gas by electricity, we are prepared to solicit patronage in this branch of the business.

The Ruhmkorff Coil and the Frictional Generator are equally applicable to this system, and we use them according to the necessity of the case in hand. When there are no special features in the work we prefer to furnish the generator.

Our burner is of the most approved construction, and is adapted to bracket, chandelier, or reflector use. It can be applied to fixtures already in use. It can be furnished to consume any desired number of feet of gas per hour.

When needed we furnish elaborate switch dials and arrange the work in separate circuits so that a portion or all the burners can be lighted at once.

In addition to the apparatus for lighting the gas, we supply the necessary fixtures of any desired design or quality. It is always preferable in fitting up new churches, halls, theatres and buildings, to have the reflectors, chandeliers, brackets, fixtures and lighting apparatus furnished by the same party, as they can be better adapted to each other, and considerable expense is saved by having them adjusted to each other at our factory.

Manufacturing our own wire and other materials, we can afford less rates than have heretofore been charged for this class of electric work.

We invite correspondence upon this subject, and information will be cheerfully imparted at any time.

Estimates for work will be furnished on application.

We will execute contracts and guarantee the success and permanence of our work.

ELECTRIC BLASTING APPARATUS.



FIG. 2.



FIG. 1.



FIG. 3.

Electric Generator and Exploders.

The great economy resulting from the use of an Electric Battery and Exploders in blasting operations is well recognized.

It has been repeatedly demonstrated that from one-quarter to one-half more work can be done with the same amount of material than by the old method.

This result is largely accomplished by being enabled to fire several holes at the same instant each helping the other.

The time of each explosion can be exactly regulated, and thus all danger to operatives from the charge hanging fire is avoided.

The electric method is more reliable than the old safety fuse system, and saves time, material and life.

The Electric Generator which we offer does not get out of repair, and is four times as powerful as the old electric battery, without being any more expensive.

The new Cotton Electric Fuses for open cut, quarries, and tunnels, are absolutely reliable; but for submarine blasting, or in wet holes, we advise the gutta percha enveloped exploders and insulated wire.

PRICES.

ELECTRIC GENERATOR \$75 00

ELECTRIC FUSE

Double Wires, cotton covered, per foot.....	1 $\frac{1}{4}$
" " Gutta Percha covered, per foot.....	2
" " with Gutta Percha capsule over all, and 18 grains pure fulminate in each, per ft.....	2 $\frac{1}{2}$

GUTTA PERCHA.

Sheet Gutta Percha (pure), per lb.....	3 50
Tubing, " " "	3 00
Insulated Copper Wire, No. 14, Gauge No. 2, per lb...	1 00
" " " 16, " " 4, " ...	2 00
" " " 22, " " 14, " ...	2 00
" " " 24, " " 14, " ...	2 00

Siamese Twin Wire, Copper, No. 22 Gauge, Gutta Percha
No. 10, per lb..... 2 50

Siamese Twin Wire, No. 22 Gauge, Gutta Percha, No. 14,
per lb..... 2 50

The Copper Wire used is prepared expressly for Electric blasting
purposes, and the Gutta Percha is absolutely pure.

The Sholes & Glidden Type Writer.



The TYPE WRITER is a machine to supersede the pen for manuscript writing.

Among the manifest advantages of the Type Writer over pen and ink, are:

1st. **LEGIBILITY.** The writing of this machine is fully as legible as print, and nearly as uniform and beautiful.

2d. **RAPIDITY.** The average speed of the pen is from 15 to 30 words per minute. The speed of the Type Writer is from 30 to 60 words per minute. Thus ten hours' work with the pen can be done with the Type Writer in five hours.

3d. **EASE.** As the operator on the machine can write with any finger of either hand, and can sit in any desired position, it is manifest that the drudgery of writing with the pen, whereby a single set of muscles is used, and a constrained position of the body necessitated, is entirely overcome. It is little else than a recreation to use the machine for a considerable length of time.

The Type Writer is adapted to the use of Reporters, Lawyers, Editors, Authors, Clergymen, Copyists, and the blind.

It is especially useful in receiving telegraph messages. By its use the receiving operator can take the message faster than the sending operator can forward it, the reverse being the case as messages are now received. On the introduction of the Type Writer on telegraph lines, their rate of speed will be considerably increased thereby.

We are the General Agents for the sale of the Type Writer for telegraphic use.

Price, \$125.00.

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